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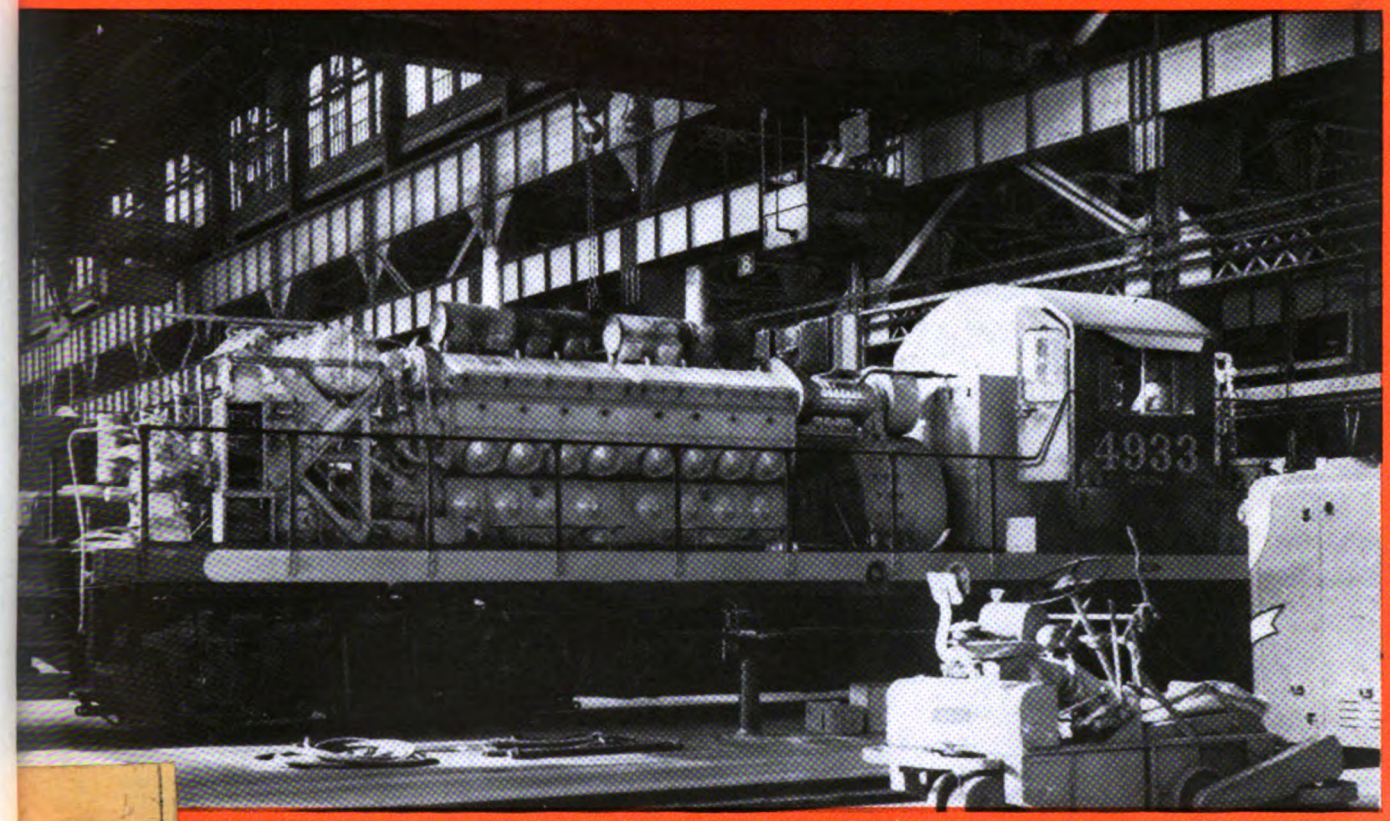
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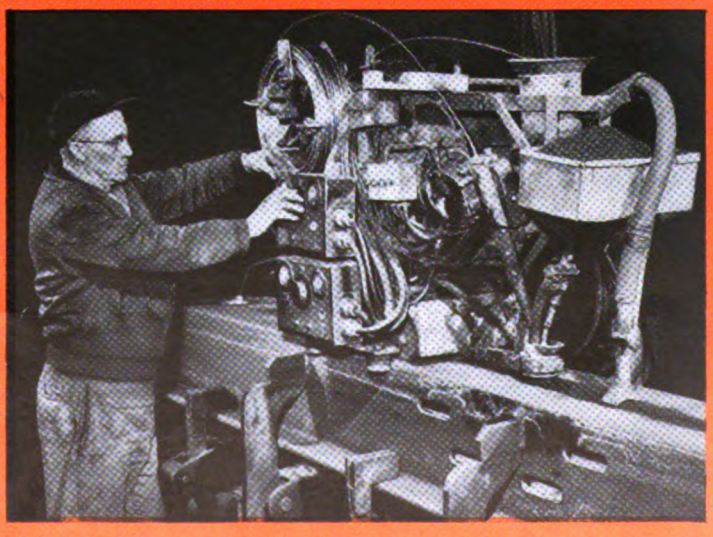
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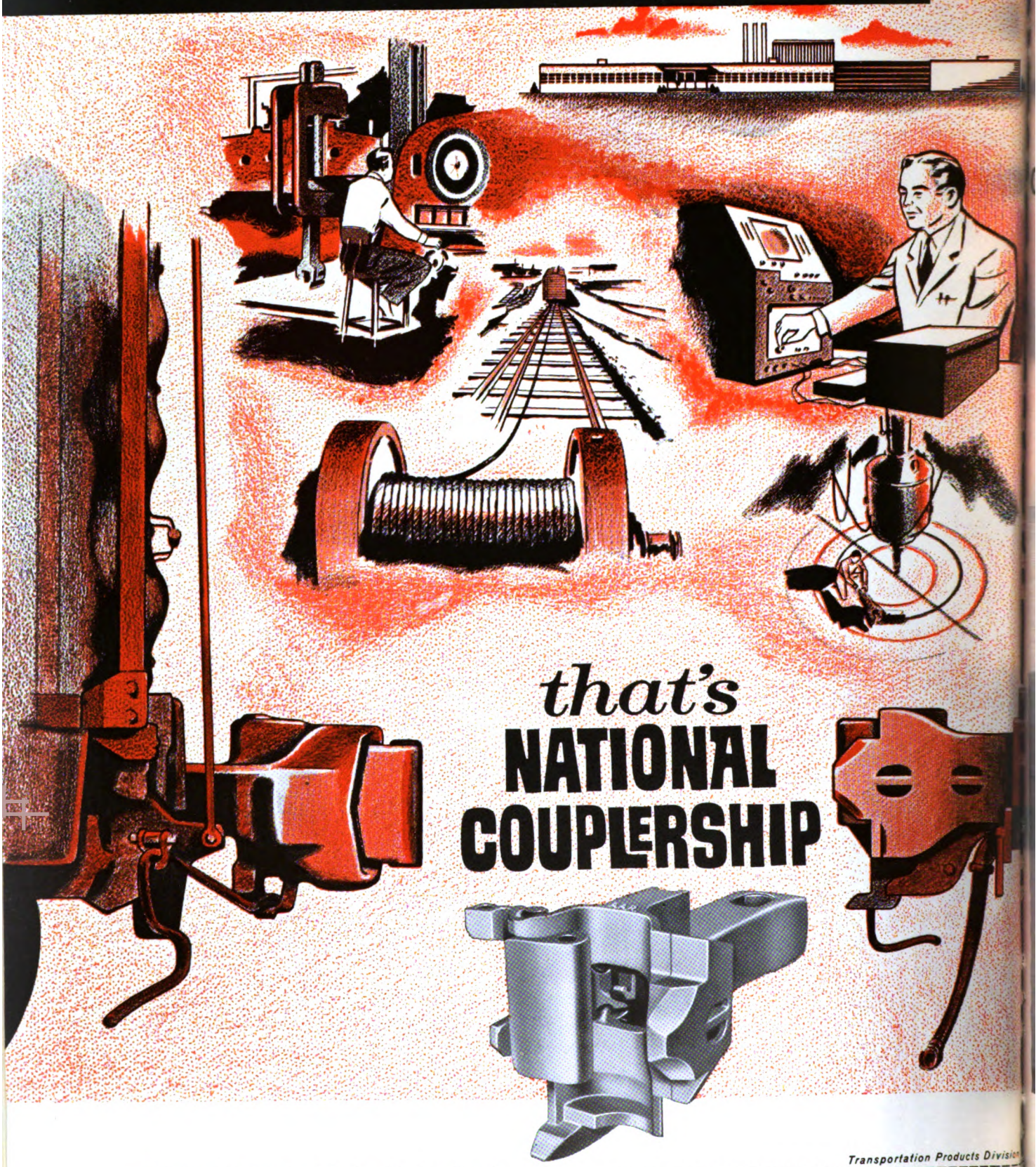
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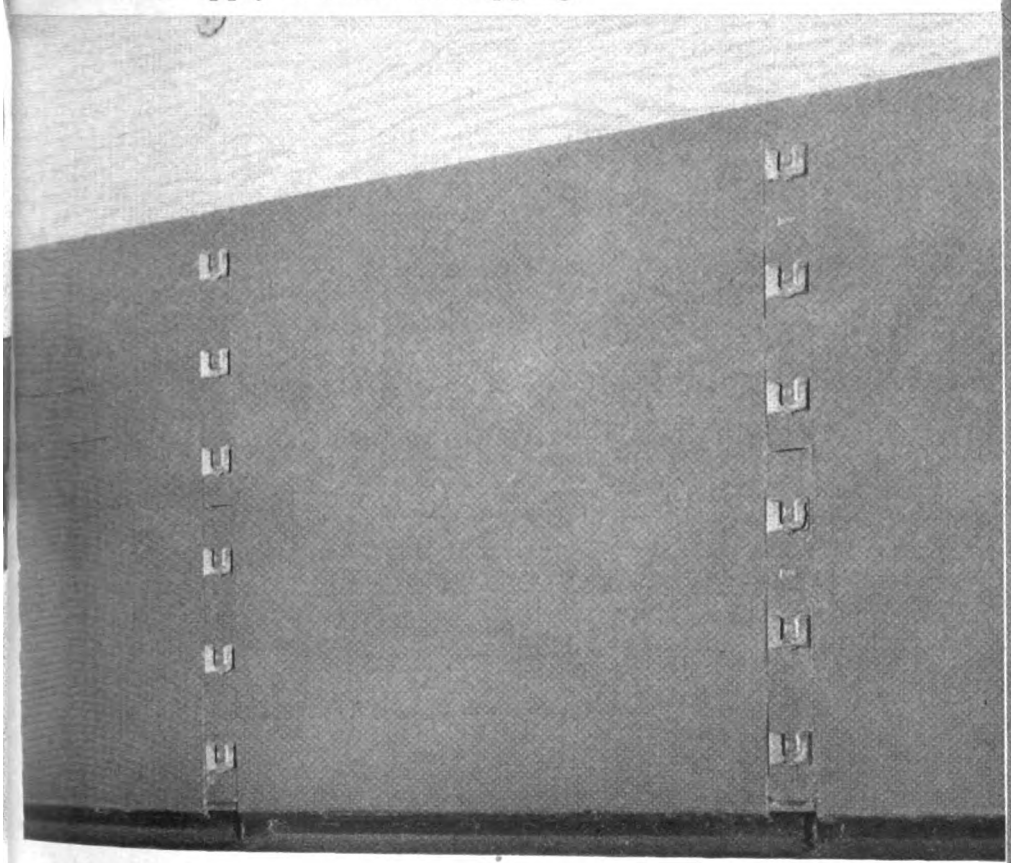
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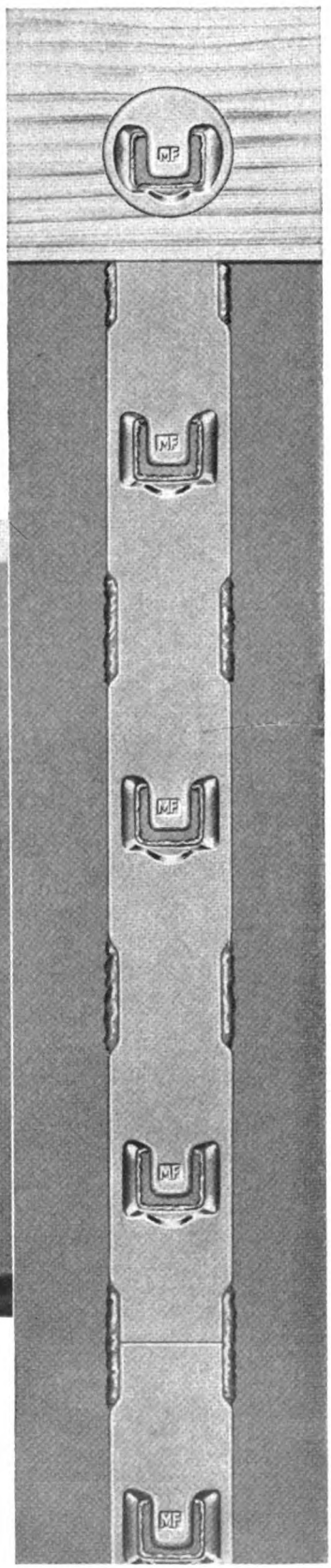
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America's Oldest Trade Paper
January, 1962—Vol. 136, No. 1

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REPORT FOR JANUARY

Roller-Bearing Grease Should Be Approved Type

Only roller-bearing greases approved under Specification M-907-56 and listed in Interchange Rule 66-A should be used for greasing journal roller-bearing assemblies. This recommendation has just been made by the AAR Mechanical Division to railroads, private car owners, and journal roller-bearing manufacturers.

Investigations of failures and distress in roller bearings show some evidence that the difficulties might be caused by improper greases and ineffective seals. The Mechanical Division reports that latest designs of roller bearings have been involved in these failures. Roller-bearing cars should be closely checked for grease leakage through the seals or around cover bolt holes. Where this occurs, it is recommended that 4 oz of grease be added and that the boxes be wiped clean. If it is known that greases not complying with specifications have been used, the AAR recommends that cars be given a complete periodic relubrication.

The grease specification has been revised to include a new procedure for determining the grease's rust preventive properties. Some manufacturers increased the inhibitor in their greases without submitting the new product to the AAR Laboratory and Lubrication Committee for approval. One railroad reports that higher inhibitor levels caused a change in grease consistency, and that some such greases have been in use. Although present difficulties are not known to be due specifically to use of unapproved greases, the Mechanical Division states it could be the reason, or one of the reasons.

The AAR laboratory presently has a program to give complete tests, including the eight weeks simulated service tests, to all greases submitted for approval under M-917-60. This program may not be completed until the spring of 1962. During this period, no list of greases approved under M-917-60 will be published, and approved greases under M-917-56 will remain in effect.

AIEE Winter Meeting Includes 12 RR Papers

Rapid transit, electrification and calculating freight train performance by digital computers will be among the featured papers of the Land Transportation Committee presentations at the winter general meeting of the American Institute of Electrical Engineers to be held January 28-February 2, 1962, at the Statler-Hilton Hotel in New York City.

Railroad papers scheduled for Thursday, February 1, include Interdependent Relationship of Operating Practices, Motive Power and Climate on Traction Motor Brush Performance—K. R. Matz, National Carbon Co.; Functional Evaluation Test Procedure for Traction Field Coils—Tor Orbeck, Westinghouse Electric Corp.; Operating Experience with Epoxy Insulation—W. E. Kelley and J. J. Kuscharsey, Pennsylvania; Automatic Safety and Vigilance Control System for Railroad Locomotives and Motor Coaches—B. Steiner, Oerlikon Engineering Co.; Aids for Calculating Freight Train Performance by Digital Computers—J. E. Hogan, Pennsylvania; and Rectifier-type Locomotive for PRR—D. R. McLeod, General Electric Co., and J. W. Horine, Pennsylvania.

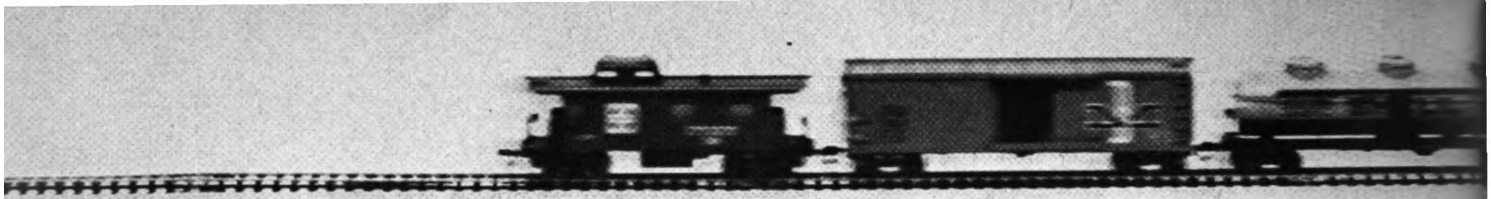
Friday's program, February 2, includes these papers: Electrification—Devil or Angel—L. B. Curtis, Pennsylvania; New Design of Current Collection Pantograph—A. Scheidecker, Establissement L. Faiveley; Trends in European Pantograph Design—G. Moehring, August Stemmann OHG, and J. Schwalm, Ringsdorff Werke; Winter Aspects of Electric Railroad Operation—P. H.

TIME SAVING IDEAS FOR JANUARY

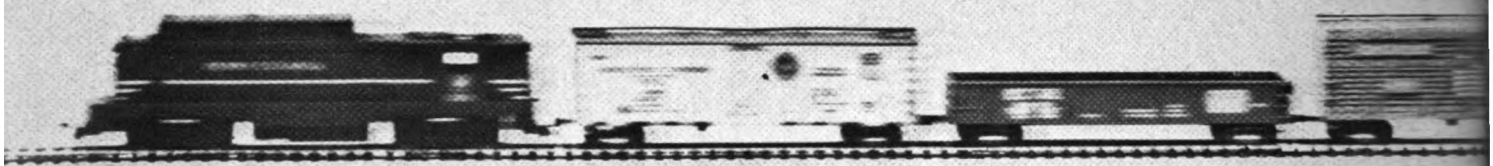
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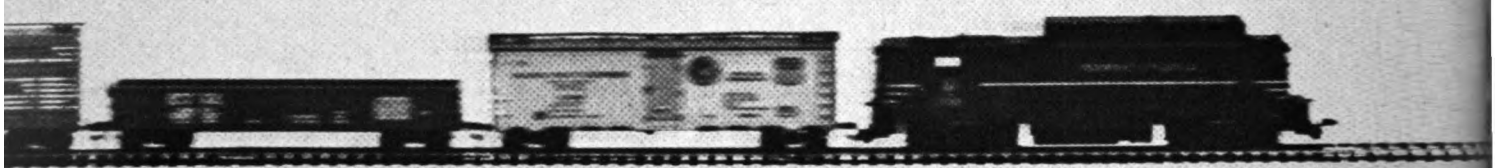
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MONTH AFTER MONTH AFTER MONTH AFTER MONTH...



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WIKIT is economical to use because of its low initial cost, top performance record and easy, inexpensive renovation.

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'Urban Transportation' To Be ASME-AIEE Theme

"Urban Transportation" is to be theme of a railway technical conference sponsored jointly by the American Institute of Electrical Engineers, American Society of Mechanical Engineers, and the Engineering Institute of Canada. The sessions will be held April 10 and 11, 1962, at the King Edward Sheraton Hotel in Toronto, Ont. The program, nearing completion and to be announced shortly, is being arranged by E. Wynne, vice president of the Canadian National, and C. M. Hines, engineering manager of Westinghouse Air Brake Co.

Joint technical conferences dealing with railway topics and sponsored by the AIEE Land Transportation Committee and ASME Railroad Division have been held during April for several years, with the exception of 1961. The two groups also hold individual sessions in conjunction with the winter annual meetings of their parent organizations.

AAR Extends Repack Period to 30 Months

The present 24 month repack period for cars equipped with journal lubricators has been extended to 30 months by the AAR Mechanical Division. The extended repack period will not apply to cars equipped with lubricators from which "conditional approval" or "approved-for-test" status has been withdrawn.

Interchange Rule 66, section a, now reads: "Journal boxes on empty cars, not repacked within time limits prescribed below, as indicated by stenciling on car, regardless of the responsibility of handling company for change of wheels or other repairs, must be repacked. If empty or loaded car is on repair track for other work and packing date is one month less than time limits shown below, journal boxes must be repacked regardless of whether or not car requires other repairs.

		Months
1.	Cars equipped with all waste packed boxes	14
2.	Cars equipped with Plypak containers	14
3.	Cars equipped with journal lubricators having approvals withdrawn	24
3A.	Cars equipped with journal lubricators, AAR approved, conditionally approved or those having test approval	30

Where cars under authorized test are stenciled for repack period beyond periods shown above, the time period stenciled on car will govern."

The Mechanical Division has urged all roads to place the modified rule in effect immediately on those cars under 3A which have repack dates less than 30 months old. No car owner is required to accept bills for 24-month periodic lubrication of these cars after December 15, 1961.

Because some journal boxes are larger than standard or contain internal features differing from those of standard boxes, some of the journal lubricating devices now available will not operate properly in them. To avoid installation of lubricators which might not perform as intended, the Mechanical Division has added notes to Interchange Rules 66 and 101 as follows:

"The Accurate journal lubricator, Hennessy mechanical journal lubricator, Optimum journal lubricator with insert locks, and Rolin journal lubricator must not be used in journal boxes of other than conventional design having different features such as Tatum-Zell anti-waste roll ledge (wide bottom) and tapered or wide contour, or in separately bolted journal boxes. These lubricators, with the exception of the Rolin, must not be used in journal boxes with waste retaining ledges. All other types of lubricating devices are suitable for application to these designs of journal boxes."

(Turn to page 44)

Orders and Inquiries for New Equipment

Placed Since Closing of December Issue

Passenger Car Orders

BOSTON METROPOLITAN TRANSIT AUTHORITY.—*Pullman-Standard:* 92 rapid transit cars. Cost, approx. $10 million. Delivery to begin third quarter 1962.

Diesel-Electric Locomotive Orders

BURLINGTON.—*Electro-Motive:* 30 GP-30 2,250-hp fast-freight diesel locomotives.

ILLINOIS CENTRAL.—*Electro-Motive:* Two E-9 passenger locomotives. Cost, $504,000. Locomotives part of 1962 $17 million equipment program.

NICKEL PLATE.—*Alco:* 11 1,800-hp road switchers—nine for freight service and two equipped for passenger service. Delivery to begin in March.

READING.—*Electro-Motive:* 20 2,250-hp GP-30 diesel locomotives. Approx. cost, $4 million. Delivery to begin in April.

Freight-Car Orders

ATLANTIC COAST LINE.—*ACF:* 300 70-ton, roller-bearing covered hopper cars for transporting phosphate. Deliveries scheduled for completion about March 1.

CHESAPEAKE & OHIO.—Company shops: 2,000 85-ton hopper cars. Cost, over $20 million. Hoppers will be largest ever built by C&O which now uses 50-, or 70-ton hoppers for hauling coal. Production to begin March 29 at rate of 32 a day.

CLINCHFIELD. — *Pullman-Standard:* 10 70-ton covered hopper cars; 10 50-ton box cars.

ILLINOIS CENTRAL.—*Company shops:* 1,166 70-ton hoppers (166 carried over from 1961 program); 800 50-ft double-door box cars; 200 50-ft damage-free box cars, and 50 70-ton, 60-ft flat cars. *Thrall Car:* 25 70-ton covered gondolas. *Unnamed builder:* 66 50-ft insulated box cars. Cars all part of 1962 $17 million equipment program.

MILLER BREWING CO.—*General American:* 350 50-ft 6-in. refrigerator cars equipped with roller bearings and 8-ft doors. All-panel, polystyrene foam insulated construction. On lease.

MILWAUKEE.—*Company shops:* 575 box cars; 25 covered hopper cars. Deliveries beginning this month.

NORFOLK & WESTERN.—*General American:* 10 70-ton, 2,600 cu ft capacity, roller-bearing Airslide hopper cars. *Ortner:* 2 52½-ft covered gondolas for handling rolled-steel products.

NICKEL PLATE.—*Pullman-Standard:* 65 70-ton covered hopper cars, each having 4,039 cu ft capacity. *ACF:* 35 3,500 cu-ft capacity covered hopper cars. Delivery of both lots scheduled to start in March.

READING.—*Bethlehem Steel:* 400 85-ton hopper cars for moving iron-ore pellets. Cost, approximately $5 million. Delivery to begin in March.

ROCK ISLAND.—*General American:* Ten 3,500 cu-ft capacity Dry-Flo 70-ton gondola cars. Seven cars delivered in December. *Pullman-Standard:* Three 50½-ft, 70-ton box cars equipped with 30-in. travel P-S Hydroframe 60 cushion underframes. For early first-quarter delivery.

SEABOARD.—*ACF:* 150 70-ton steel covered hopper cars for transporting phosphate rock. Cost, $1,750,000. Delivery scheduled for March.

TENNESSEE CENTRAL.—*Ortner:* 15 70-ton gondolas. For March delivery.

TRAILER TRAIN.—*Pullman-Standard:* 182 king-sized flat cars. *Bethlehem Steel:* 102 king-sized flat cars. *ACF:* 35 king-sized flat cars. *General American:* Five king-sized flat cars.

WESTERN PACIFIC.—*ACF:* 10 Center Flow tubular aluminum covered hopper cars. Cars designed with assistance from Kaiser Aluminum, to be used for shipment of bulk edible commodities. One car delivered in November.

Notes and Inquiries

Burlington will purchase 965 cars in 1962—125 insulated box cars with load dividers; 50 DF, 50-ton box cars; 50 flat cars with special bulkheads; 50 70-ton bulkhead gondolas with removable tops; 40 70-ton Airslide hopper cars; 150 50-ton, 60-ft flat cars; 100 65-ft gondola cars; 200 50-ton, 50½-ft box cars with nailable steel floors; 100 double-deck stock cars, and 100 mechanical refrigerator cars with cushion underframes and provision for meat rails. All cars will be roller-bearing equipped. Burlington will also purchase 80 multi-level rack assemblies for installation on existing flat cars for carrying new automobiles, tractors and agricultural implements.

CHESAPEAKE & OHIO has just completed rebuilding 5,500 cars and is starting on the rebuilding of an additional 2,000 which will continue through March 28. On June 26, on completion of the new order for 2,000 85-ton hopper cars reported above, 500 new 70-ton hoppers will be built, using reclaimed trucks, air brakes, and some other components. This will be followed by the rebuilding of 2,000 50-ton hoppers and 500 70-ton hoppers.

Milwaukee's capital budget for 1962 includes $8,500,000 for purchase of 655 freight cars and $4,500,000 for improvements to existing freight and passenger equipment. Equipment purchases will include 500 50-ft 5-in. plug-door box cars; 50 Airslide hoppers; 70 50-ft insulated box cars; 10 50-ft 5-in. box cars with damage prevention devices, and 25 jumbo covered hoppers.

Missouri Pacific will purchase approximately 50 new mail and express cars in 1962, according to President Downing B. Jenks. A program at its Sedalia, Mo., shops will involve rebuilding, "from trucks to roof," every passenger car in the road's fleet of trains operating throughout the West and Southwest. Starting in February, according to Mr. Jenks, the road expects "to have 175 men rebuilding cars at the rate of 12 per month." At the time the program was announced early in December, 45 men were turning out three or four cars per month. This passenger-car upgrading program, which it is expected will take three years to complete, is not included in the $27 million capital improvement program announced in the December issue, p 6. Existing freight equipment is also to be upgraded at Sedalia, DeSoto, Mo., and Palestine, Tex., shops "to bring the percentage of bad order cars on the MP down from the present 8% to below 3% by next summer." Eleven hundred hopper cars are programmed for rebuilding during the first half of 1962, followed by an upgrading program on box cars. The shops will also equip more cars for special handling of automobiles and parts and work will be done on rehabilitating camp car equipment used by track maintenance forces. An important feature of the whole program, Mr. Jenks said, is to "plan the work so as to bring about a stabilization of employment."

MP will also replace 13,600 cast iron freight car wheels with steel wheels in 1962, as the beginning of a program which will take several years to complete.

New York City Transit Authority proposes to issue bonds to finance the purchase of 1,000 new subway cars at a cost of $125 million. If approved, the proposed 1961 capital budget placed before the Board of Estimate, including $61 million for purchase or modernization of 600 cars, will be made a part of the $125-million program.

Trailer Train has authorized purchase of 76 king-sized flat cars in addition to the 324 for which orders have been placed as noted above.

Traction motor brush life increased 42 to 75 percent with New Electro-Motive Constant Pressure Spring Cells

Reliability tests at five major railroads, lasting up to 2½ years with new EMD constant pressure spring cells, showed brush life increased from 42 percent on fast passenger service to as much as 75 percent on heavy drag operation. The new cells also improved commutation and reduced commutator maintenance wherever they were used.

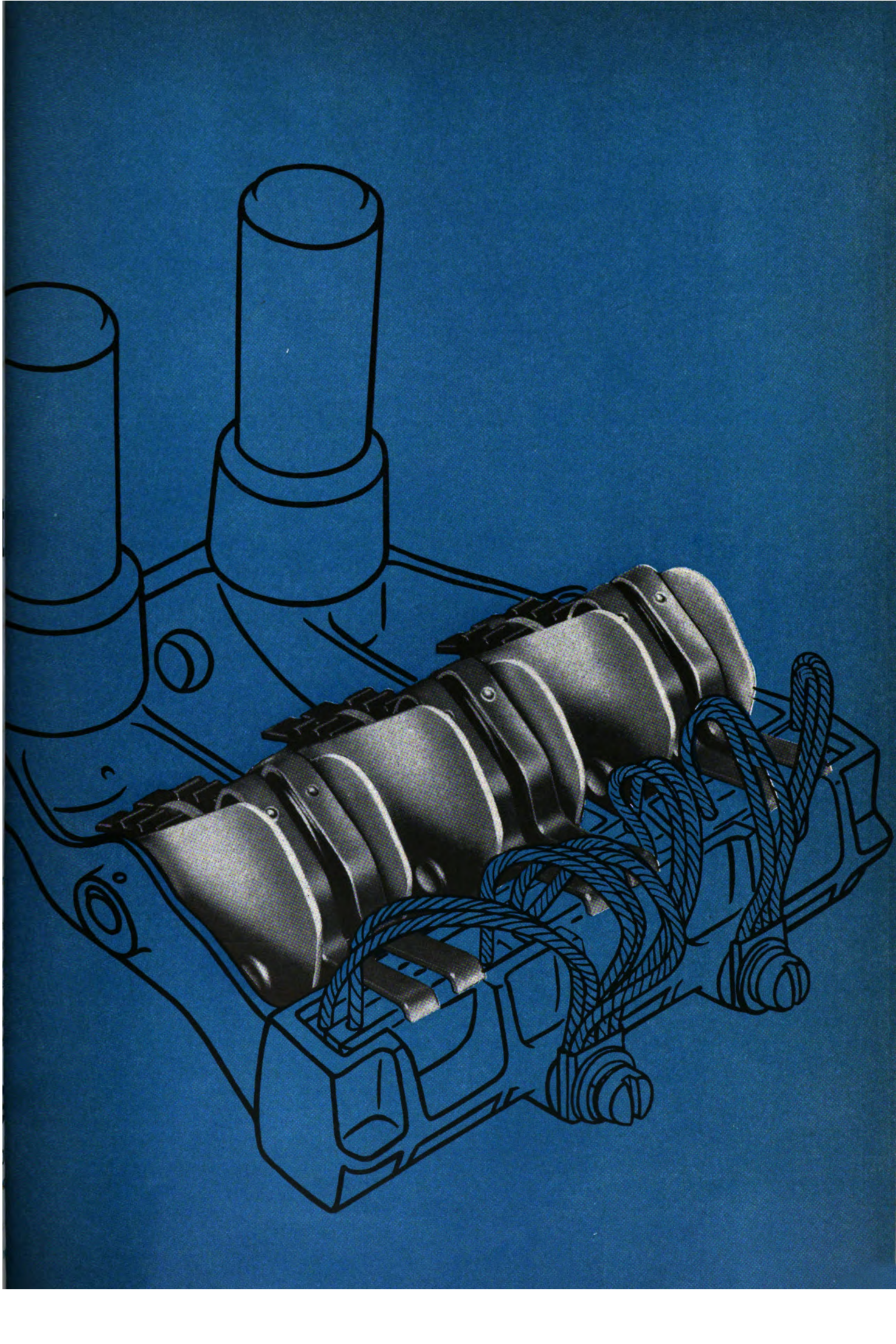
Here's why. Electro-Motive spring cells exert a constant pressure of 3½ to 4 pounds on the brush, regardless of whether it is new or worn. The brush is always held in intimate contact with the commutator . . . eliminating brush bounce sparking, flashovers, and commutator bar burning . . . resulting in far longer brush life.

Brushes are new, too—have a special clearance notch centering the spring cell finger on the brush, helping it maintain constant pressure. Brush changeout is easier. A holding clip built into each spring cell keeps brush fingers in a raised, out-of-the-way position when brush wafers are removed or replaced.

New and exchanged D47B and B-1 traction motors have been equipped with new EMD constant pressure spring cells since May, 1961. But you can enjoy all their advantages right now by converting—and it is actually easier to convert than to renew conventional springs. **For complete information, write Electro-Motive Division, La Grange, Illinois or contact your nearby Electro-Motive Representative.**

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EDITORIALS

Team Work Pays Off

Equipment developments during 1961, indeed, over the past three or four years, have been outstanding. More has been accomplished by the team work of railroads and the supply industry in this area than in any comparable period of the railroads' history.

The numerous new car designs, mentioned elsewhere on this page, are noteworthy for three reasons:

- All are tailored to meet shippers' requirements for handling specific commodities.
- Many have built-in loading and unloading features and equipment that either reduce or eliminate loss and damage.
- Many have improved the payload to gross weight ratio by use of lightweight construction materials, by design and by a trend toward cars of large capacity.

Motive power to haul these cars can be selected from a number of new higher-horsepower models with many significant operational improvements to supplement the increase in capacity. There is no doubt about the fact that domestic builders have diesel-electric, electric and gas-turbine designs to meet all the power requirements of our railroads. At the same time the six diesel-hydraulic German-built locomotives delivered late in 1961 have added a new competitive type to the picture. The mettle of these locomotives is now being put to test under rigorous conditions in the proving grounds of the Rockies. Until performance data, to date unavailable, are released, no assessment can be made of the role the hydraulic drive will play in tomorrow's motive power. It is a good bet, however, that the diesel-hydraulic's advantages will be utilized in the future, particularly in operations through heavy-grade terrain where high adhesion is particularly valuable.

Shop equipment, methods and planning have been keeping pace with rolling stock and motive power improvements. The installation of many diesel spot-repair shops probably highlighted the past year's activities in this field. This system is merely another example of the application of cost-saving production-line techniques to railroad maintenance and repair work, techniques that have been successfully used for car work and component repairs.

Summing up, progress in rolling stock, motive power, shop equipment and shop methods has been moving forward at an accelerated pace. Much of this progress has been due to the critical economic plight of the railroads —because of their search for the means to hold and regain traffic, to improve operations, to find ways to save money. The same motivation will spur comparable advances during the coming year.

The mechanical department and the supply industry can be proud of their accomplishments during 1961. Probably nothing exemplifies the progress that has been made more than the fact that the hot box is no longer the department's No. 1 problem. It hasn't been eliminated but a record improvement has been made. The results clearly demonstrate what the railroads can do when th... pool their resources in an attack on a century-old comm... problem. The same team work will be effective in gett... the railroads over other hurdles, whether they be techn... logical, political or economic.

It's Your Business!

The railroads are widely looked upon as a dying indus... —but they are not; they can't be. The public gets its i... pression of the railroads largely through what it sees o... passenger service, much of which railroads have be... forced to abandon. Also, they hear the railroads' co... plaint of their plight and look upon it largely as bell... aching.

But do they know what the railroads are doing for the... selves and do they know that we must have efficien... operated railroads if we are to meet rapidly rising comp... tition?

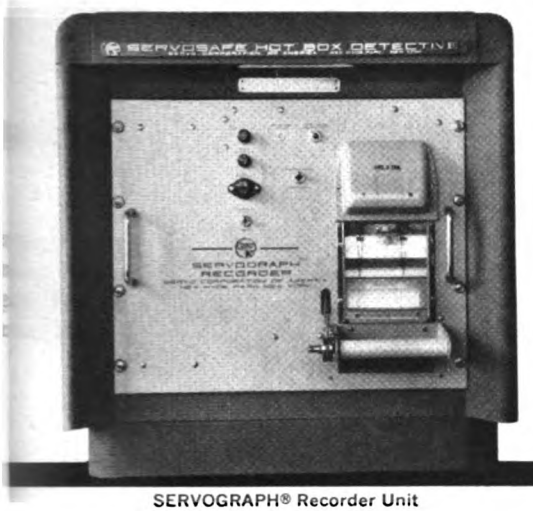
One example of what the railroads are doing for the... selves was the track exhibit held in Chicago by the Allie... Railway Supply Association during the September mee... ings of the Coordinated Mechanical Associations. Ea... and every exhibitor showed only newly developed equip... ment, including totally new types of special service ca... and bigger cars and devices for radically improving exis... ing cars and freight service.

Similarly, the 21st edition of the Car Builders' Cycl... pedia, just off the press, is an accurate and all-inclusi... assembly of data on what the supply industry is doing t... meet railroad needs. No previous edition ever include... so much new material. Among the cars illustrated an... described are many with axle loads which are greater tha... those of the locomotives which haul them, and they ar... required to move at speeds of seventy miles an hour. Th... locomotive manufacturers are being hard pressed to sup... ply the necessary horsepower.

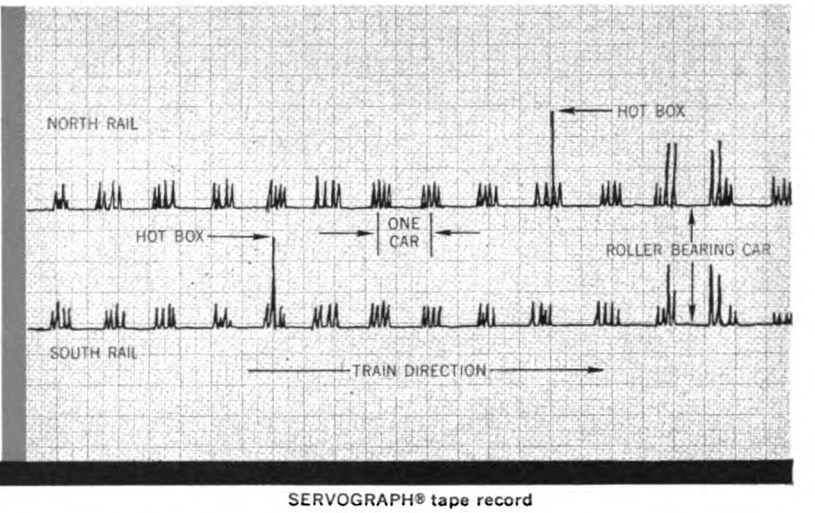
Don't listen to anyone who says the railroads are no... doing their part and let them get away with it!

Car Builders Cyclopedia

The 21st Edition, Car Builders Cyclopedia, is off the press and ready for distribution. We believe the new book to be the best since the first edition was published in 1879 as the Car Builders Dictionary by the Master Car Builders Association. We welcome all subscriptions to the new edition at $10 per copy to railroad men ($15 to other-than-railroad men), but we want to make sure that railroad subscribers understand the book will soon be made available to them through their mechanical departments at lower prices on a group order basis. Prices will be reduced on a sliding scale from $9.50 per copy for an order of six copies down to $6 per copy for an order of 150 or more copies.— ***Car Builders Cyclopedia, 30 Church st., New York 7, N.Y.***



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SERVOGRAPH® tape record

LEARN TO LIVE WITH HOT BOXES!

Heavier loads, faster speeds, longer runs... and hot boxes continue to be a problem as old as railroading itself. No one has to tell the Mechanical Department that overheated journals are still with us, despite many recent improvements in lubricators and maintenance practices. With complete elimination of the causes of hot boxes a long way off, it's time to consider every possible means of living with them.

When Is A Hot Box "Hot"? If you consider a box to be hot only when it's lighting up the landscape around a stalled train or wreck, or when it belches smoke or burns the car inspector's hand, then the first step toward making your peace with this operating enemy-number-one is to recognize it in the "suspect" stage. Long before burnoff, and some time before the likelihood of detection by manual or visual means, faulty or improperly lubricated bearings begin to show symptomatic rises in temperature above the average for other, "normal" bearings on the same train. Devious devils, these suspects may continue undetected and undetectable for many miles or they may burst into flame before clearing the yard. The one infallible way to spot them as likely troublemakers is with an approach-to-yard SERVOSAFE® Hot Box Detective* installation.

■ **How The SERVOSAFE® Detective* System Helps You Get Your Hooks On The Real Offenders.** Located a few miles outside the approach to a yard, the infrared scanners of a SERVOSAFE® unit register comparative temperatures of every journal box on the incoming train. By the time the train arrives, your inspectors and maintenance men are equipped with the evidence to stage their own "lineup" of suspicious characters, based on the assurance of 100% uniform inspection of every journal before a single lid is opened.

■ **How "Efficient" Is The SERVOSAFE® Hot Box Detective System?** "Efficiency, I believe," says Bob McKnight, Editor of *Railway Signaling & Communications*, "is a misnomer when applied to hotbox detectors... it usually means the ratio of hotboxes found to the number indicated hot by the detector. This is misleading because people interpret a high numerical value for this ratio to mean that the device is *efficient*, hence a very good thing. If this ratio is low, people discredit the device and its use.

"What throws efficiency out of kilter is the ratio numerator—*hotboxes found.* The cause is the time lag that naturally occurs between the time the detector spots a hotbox until the train is stopped and the overheated journal found by a trainman or a car inspector. This time delay is sufficient in many cases to allow for proper cooling of a journal so that no hotbox is found... this should not condemn the detector. It did its job properly, but the fact that a man can't lift a journal box lid on a moving train necessitates the time delay."†

When properly judged as a ratio of the number of accurate indications recorded to the total number of journals scanned, efficiency of the Hot Box Detective approaches 100%.

■ **Selective Maintenance And How It Pays Off.** Tests with approach-to-yard SERVOSAFE® Detective installations prove that the number of set-outs for journal box maintenance can be drastically and safely reduced by limiting attention to those bearings shown by the instrument to be operating at temperatures above normal for the train. One road reported a reduction of 12:1 in set-outs following SERVOSAFE® installation and the adoption of this maintenance practice. Savings in inspection-time delay are obvious. Down-the-line savings—elimination of train stoppages, burnouts, and derailments—are even more dramatic. For example, one major road reporting 266 hot boxes found in 12 months of SERVOSAFE® operation, stated that 174 of them *could not have been detected by visual or manual inspection!* Yard inspection efficiency (as measured by reduced operating costs and increased car availability) invariably goes up when yard crews are forewarned by the SERVOSAFE® Hot Box Detective of overheated journal locations.

■ **Living With The Problem.** Improved equipment and heads-up maintenance have done much to offset the mechanical causes of journal failure, aggravated by increasingly difficult operating conditions. Successes in these areas are commendable and are being pressed to the limit by Engineering and Mechanical Departments. Yet only recently, for the first time since dieselization and the long fast train, has a really major assist in preventive maintenance become available with perfection of the SERVOSAFE® Infrared Hot Box Detective System. Integrated with yard inspection programs, this device is making it possible to live with the hot box problem. The number of such installations has grown rapidly, even during periods of retrenchment, to a present total of over 350 on 28 major Class I roads.

SERVOSAFE® Hot Box Specialists are available for immediate consultation. Get with them soon, marshal your figures, and start pushing for a real breakthrough in hot box cost reduction.

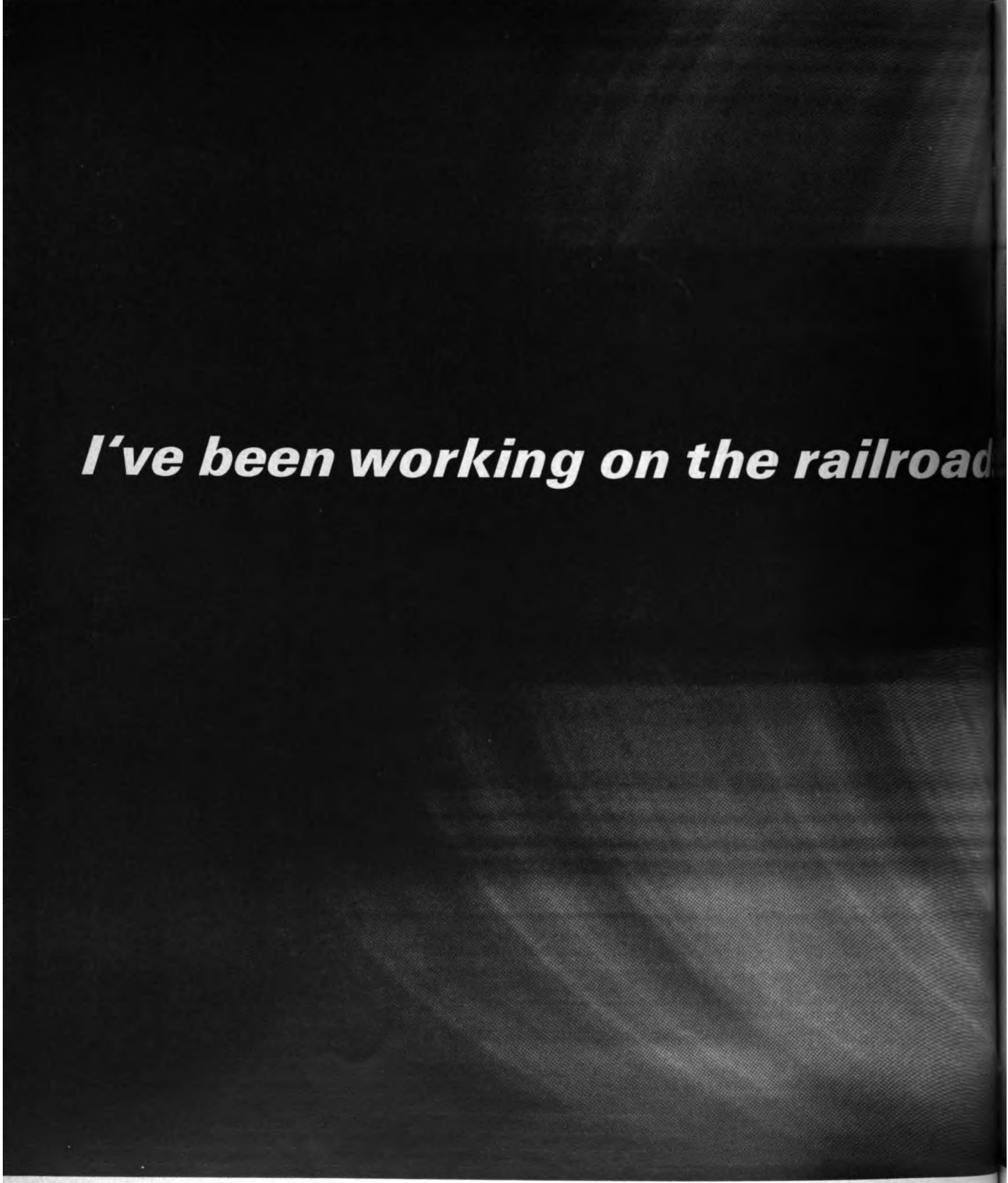
†*Railway Signaling & Communications*, October, 1961

Railroad Products Division

SERVO CORPORATION OF AMERICA

111 New South Road
Hicksville, L. I., N. Y.

*Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.



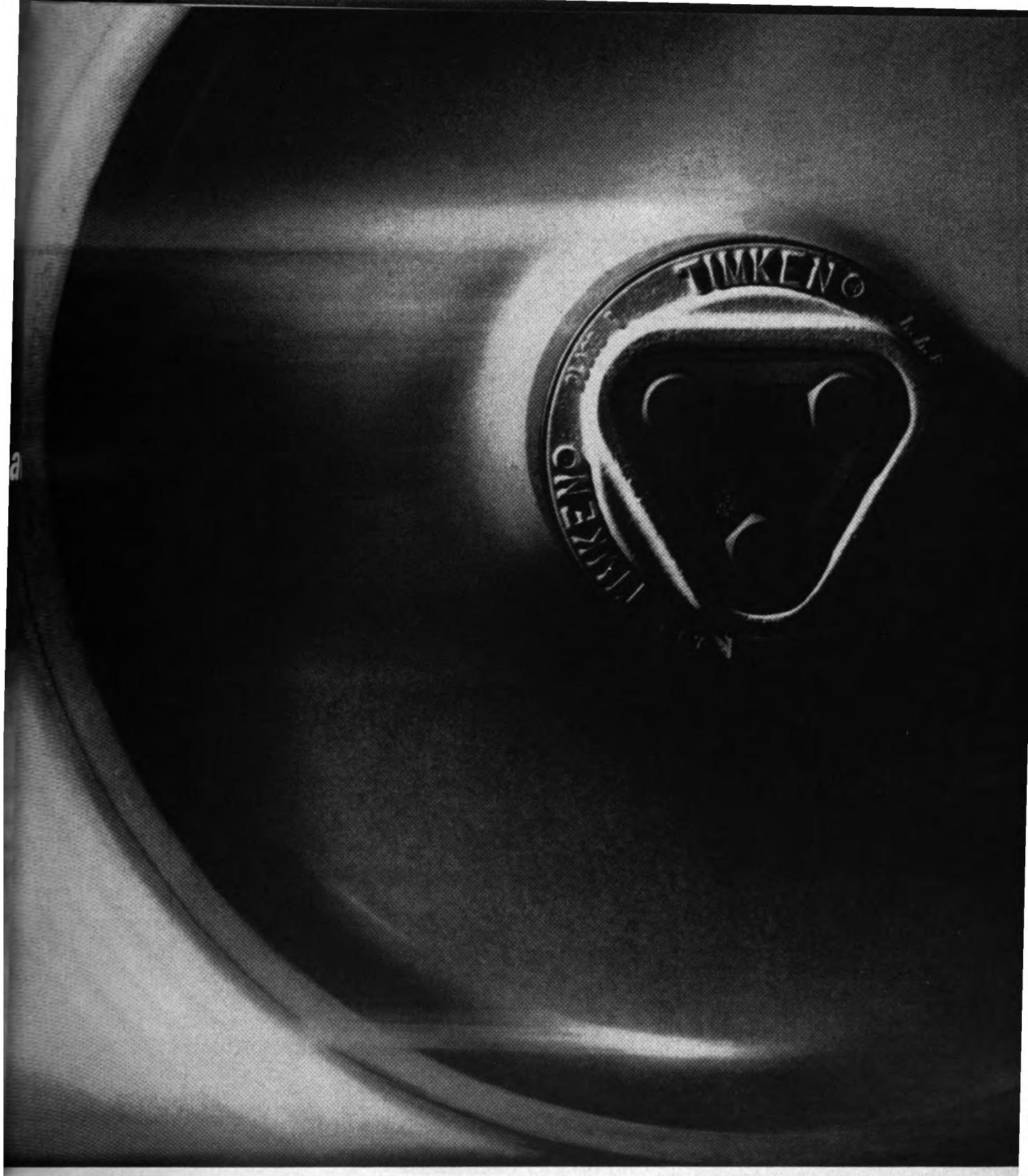
Railroads and other car owners have over 85,000 freight cars on Timken® tapered roller bearings. These Timken bearings are rolling up new records in performance and economy all the time. Here's why:

1. They're precision-manufactured to be trouble-free, solve the hot box problem.

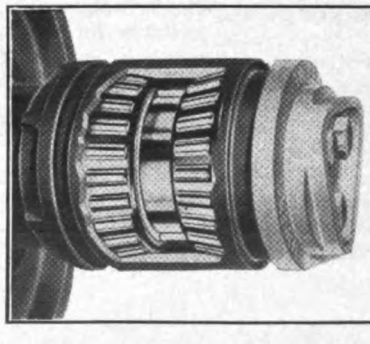
2. We make our own nickel-rich steel, an extra step no other American bearing maker takes.

3. Timken "AP" bearings are made in plant specifically designed to produ railroad bearings. This revolutionary pla can turn out 320,000 bearings a year exacting specifications.

4. Our special roller-steel inspecti equipment and ultra-sonic testing steel assures uniform, higher quality roll and races.



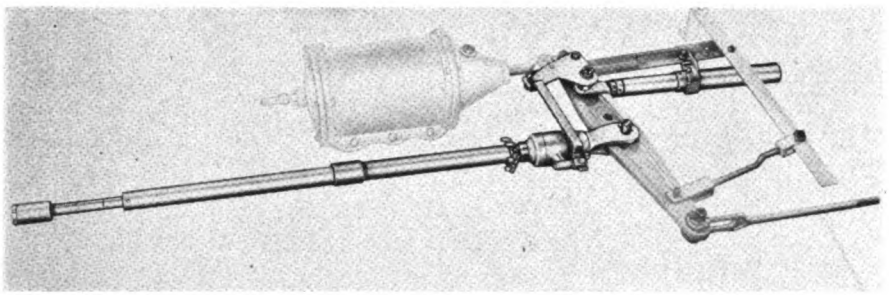
5. And everything we've learned during 63 years of making only tapered roller bearings goes into the "AP" bearing to give you the most dependable, lowest cost performance. If you want bearings like this to solve the hot box problem, cut operating and maintenance costs to the bone, call or write: Railroad Division, The Timken Roller Bearing Company, Canton 6, Ohio.



HEAVY DUTY

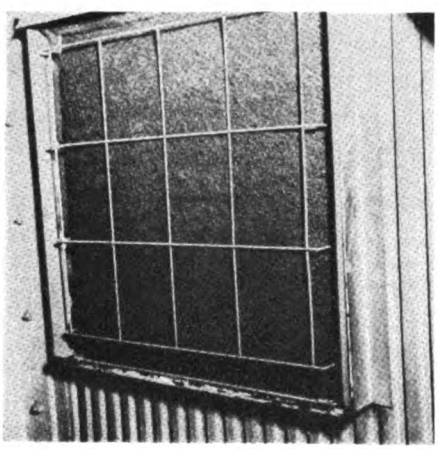
TIMKEN®

TAPERED ROLLER BEARINGS



Double-Acting Automatic Brake Regulator

The Ajax-FFA double-acting automatic brake regulator meets all AAR requirements for freight-car automatic slack adjusters. It adjusts slack either way on application of air brake and while there is no load on the regulator. It features instantaneous let-out to pre-determined piston travel on first brake application, and is said to be shock-proof and unaffected by car dumping operations. Shoes can be replaced and piston travel maintained without any manual adjustment of the regulator or brake rigging. The regulator can be applied either to the top rod or center rod. *Ajax Consolidated Co., Div., Southern Electric Co., Dept. RLC, 8701 South Greenwood ave., Chicago.*

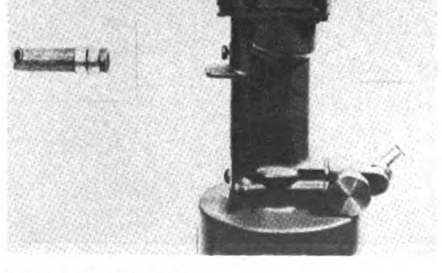


Disposable Air Filter

The light-weight, self-sealing ULOK Transportation Air Filter, made of Dynel modacrylic fiber, will fit all types of holding frames on diesel locomotives and passenger cars. It is said to have twice the dust-holding capacity at one half the pressure drop than 4-in. permanent filters, and correspondingly higher efficiencies and holding capacities than other 2-in. filters. It operates at face velocities above 500 ft per min, remaining stable under all weather conditions. The filters are available in 1-in. and 2-in. thicknesses. They can be changed in the enginehouse, at the refueling station, or on the ready track. *Union Carbide Development Co., Dept. RLC, 270 Park ave., New York 17.*

Hollow Structural Tubing

Hot-rolled carbon-steel hollow structural tubing, made to structural steel specifications from standard A7 and A36 structural carbon steel, is now being produced in a wide range of square and rectangular sizes —from 1 in. to 8 in. square and from 3-in. x 2-in. rectangles to 6-in. x 4-in. rectangles —and stocked in lengths 36 to 42 ft. Serving as load-bearing columns, the hollow structural sections, according to National Tube, will be useful in designs for most movable and portable structures, as well as for building construction. Side stakes in gondola cars are a potential. *National Tube Div., United States Steel Corp., Market Development, Dept. RLC, 525 William Penn Place, Pittsburgh 30, Pa.*



Tubing Tool

The Sleeveset tool is a portable, lightweight accessory for use with the Cherry G87B Lockbolt gun in presetting sleeves for flareless couplings primarily on seamless stainless-steel and mild steel tubing in high-pressure applications. The tool is 4 in. long and 2¼ in. high and operates on 90 psi air pressure to pre-fasten sleeves on tubing ⅛ to 1¼ in. *Cherry Rivet Div., Townsend Co., Dept. RLC, Box 2157-Z, Santa Ana, Calif.*

Voltage Regulators

A 32-volt model transistorized voltage regulator, the third and smallest F-M size, is for use on passenger coaches and other rolling stock. The larger models—75 and 125 volts—are for controlling output of auxiliary generators on locomotives. The 32-volt model has no moving parts; needs no shock mounting; holds the desired voltage with 1% plus or minus, and is compact —8 in. high 7⅞ in. wide, and 8 in. deep. *Fairbanks, Morse & Co., Magneto & Engine Accessories Div., Dept. RLC, Beloit, Wis.*

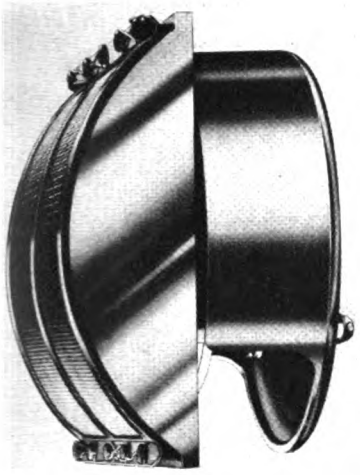


Retractable Hose Reels

Retractable reels mounted in the shops of the Union Tank Car Co. at Wood River, Ill., handle hose for compressed air, water, steam, and oxygen-propane. The reels are mounted on pedestals approximately 12 ft above the work deck. The pedestals, located between every second car position, also hold other equipment needed for the work done at each station. Hose capacity of each reel is 50 ft, regardless of hose size. Compressed air for tool operation and valve checking is supplied through ½- and ¾-in. I.D. hose, and 1-in. I.D. hose is used for water and steam. Twin ¼-in. I.D. hose, mounted on dual reels with two inlets and two outlets, is used for oxygen-propane. An air-motor rewind reel handling 3-in. I.D. water hose is used in the heavy tank repair section for fast filling tanks when checking for leaks. *Clifford B. Hannay & Son, Inc., Dept. RLC, Westerlo, N. Y.*

Relief Valve

A crankcase explosion relief valve, developed by the British Internal Combustion Engine Research Association, is provided with an internal oil-wetted wire gauze flame trap, which, it is said, can absorb three times as much heat because of the more even distribution of gas flow through the gauze. The cooling capacity of the gauze is also increased when oil-wetted. In most cases this is effected by the oil mist condi-



ons normally prevailing in the crankcase, r by oil spray from connecting rod bear-ıgs. For complete protection, it is recom-ıended that relief area be provided at the ıte of 3 sq. in. of relief valve area to each ɔot of crankcase volume. The valves are vailable in 6-, 10-, and 12¾-in. sizes which ive an effective area through the valve of 8, 78, and 128 sq. in., respectively. *Chown-ıg Regulator Corp. (BICERA licensee), Dept. RLC, Corning, N.Y.*

Car Lining System

uper Koropon, a non-toxic lining system or railroad cars, is designed to protect such oods as rice, wheat, malt, sugar, etc. It is esistant to abrasion, corrosion, and chemi-al fumigants, and is unaffected by cleaning olutions, steam, or water. Its hard surface s said to minimize sticking tendencies of ry foods and to reduce unloading and leaning time. The lining has been approved y the U.S. Food and Drug Administration. *DeSoto Chemical Coatings, Inc., Dept. RLC, Chicago, Ill.*



Lapping Machine

A new abrasive distribution system is said to maintain the correct mixture of compound to vehicle from initial filling to the last drop in the Model 36 Lapmaster, redesigned verison of the present 36 in. Lapmaster. Pressure pumping at a constant head assures uniform deposit at the lapping stations and provides an adjustable flow control to obtain maximum stock removal. Pump and tank are mounted inside of door in machine base. The Model 36 is equipped with either three or four conditioning rings and is available with pneumatic lifts to facilitate raising and lowering of conditioning rings and/or pressure plates. Parts of almost any shape, form or material can be lapped on a production basis within tolerances of one light band or less and uniform micro-inch finishes of 2 to 3. *Crane Packing Co., Dept. RC-6, 6400 Oakton st., Morton Grove, Ill.*



Diesel Pistons

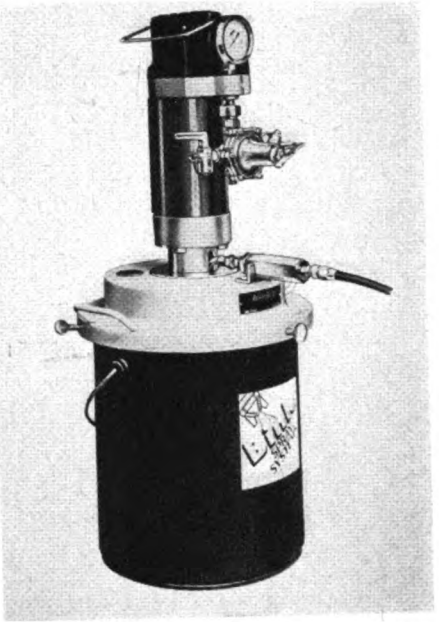
Remanufactured forged-aluminum, oil-cooled Ni-Life pistons incorporate a cast-aluminum ring carrier that has an integral Ni-Life insert in the top ring groove. These pistons for railroad diesel engine repair and rebuild are said to give two to five times the original life of all-aluminum pistons. *Ohio Piston Corp., Dept. RLC, 11786 Superior ave., Cleveland 6, Ohio.*

Non-Skid Surface Compound

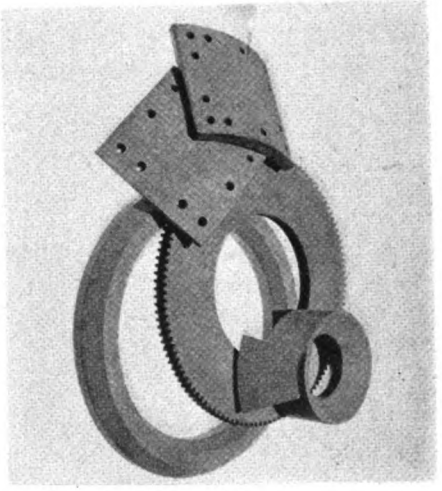
Dura-Grip, a non-skid compound applied to 1,500 sq ft of diamond steel plate on the double-deck platforms in the shops of a large eastern railroad is said to provide a "sure-footed" surface for mechanics, electricians, and others who service diesel locomotives. The compound is a grit-impregnated resin. After preparation of the platform surfaces, the first coat was applied and, when still wet, sprinkled with aluminum oxide grits. After drying for about an hour at normal room temperature, excess grit was swept off and reclaimed. A second coat rolled over the grit produced the finished surface. *Mine Safety Appliances Co., Dept. RLC, Pittsburgh, Pa.*

Filter for Airless Spray Painting Units

The anti-clogging principle and the 3.14 sq in. filtering area featured in the Model 41-1415 inline paint filter provides from 8 to 16 hr spraying time at capacities up to 32 oz per min before cleaning is required.



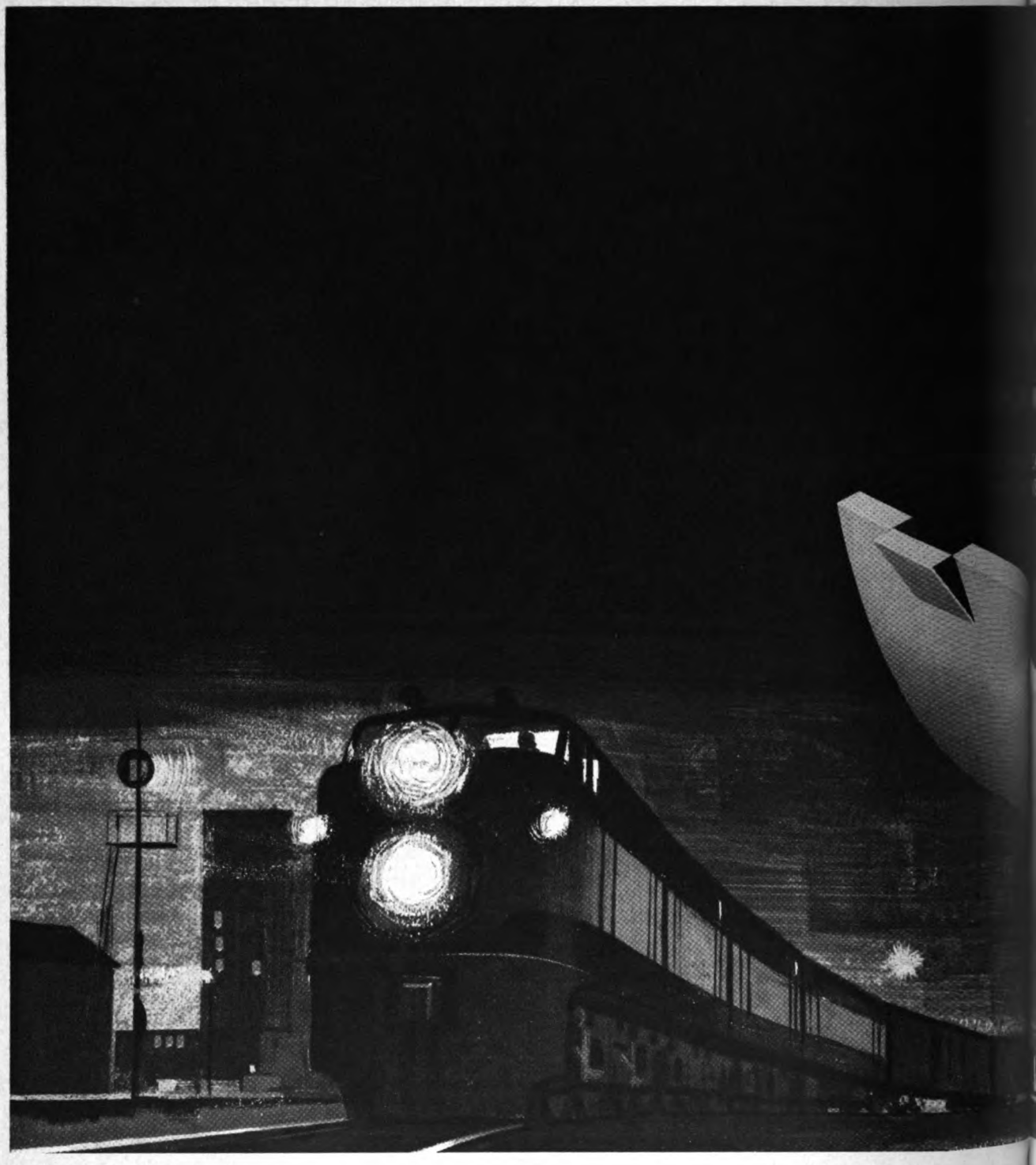
With only 5% of the filtering area open, the pressure drop across the element is zero. By reversing the fittings, the unit may be attached directly to the Binks Model 39 hand spray gun, Model 41 automatic gun, or Model 42 airless pole gun. The filter element is a permanent type, easily removable for cleaning. Any standard cleaning solvent can be used. *Binks Mfg. Co., Dept. RLC, 3140 Carroll ave., Chicago 12.*



Friction Material For Severe Service

Positive control of brakes and clutches at temperatures up to 1,000 deg F, under conditions of high loads and fast cycling, it is said, can be had through the use of a new organic friction material, J-M-Style 160. The material exhibits an average coefficient of friction of .56 at 350 deg; .62 at 600 deg, and .53 at 1,000 deg F, demonstrating unusual absence of friction fade. Rate of wear is well within the acceptable limits for materials of high friction level. Style 160 is a rigid, molded material, tan in color, containing zinc particles. It is manufactured in blocks, facings and sheets. *Johns-Manville, Dept. RLC, 22 East 40th st., New York 16.*

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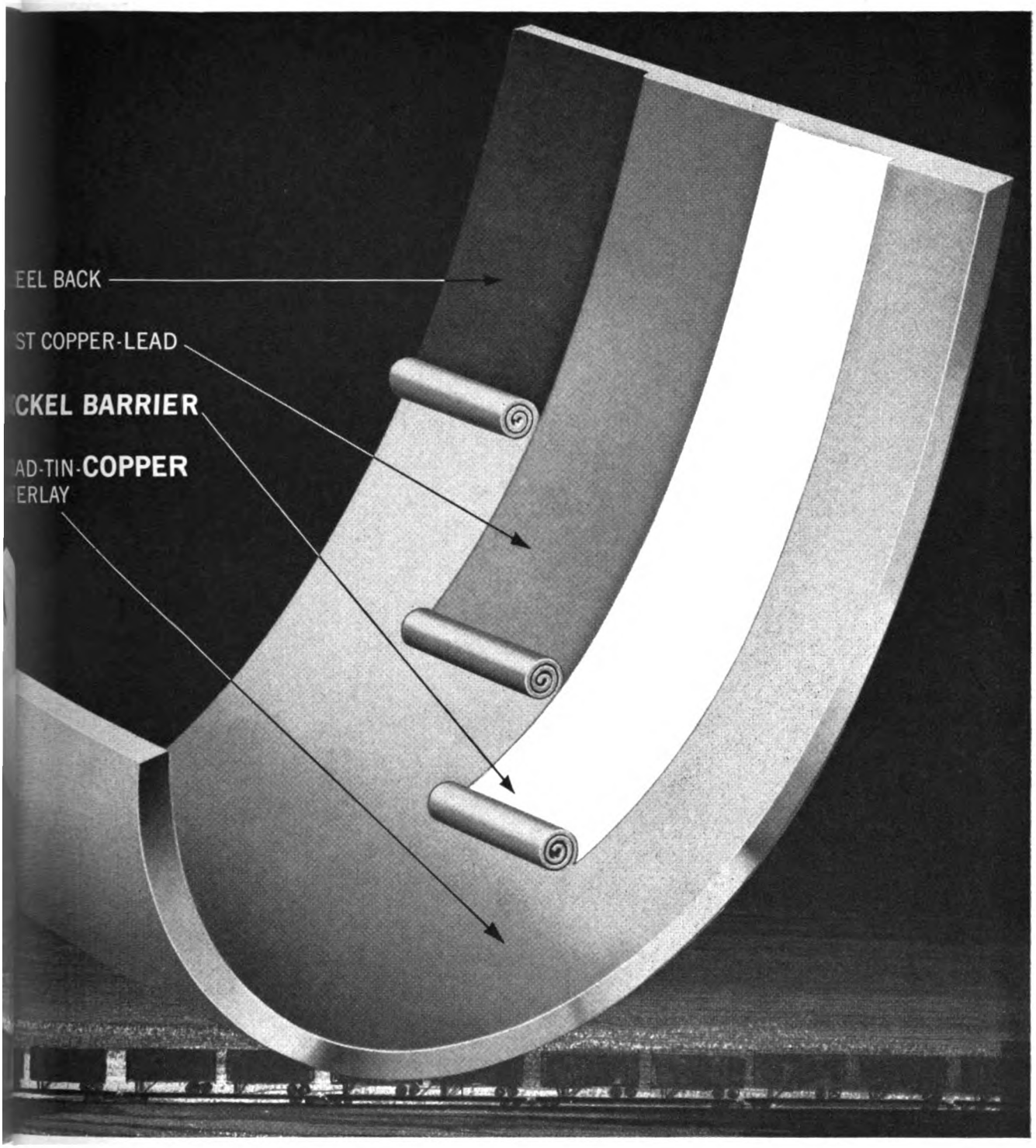


NEW SOURCE FOR EMD

Old but new. Cleveland Graphite Bronze, long a lea
in the field of large engine bearings, now offers
heavy-duty bearing for replacements in EMD main
rod bearings.

It's a four layer bearing that has proved its superio
through 12 years' service in all types of diesel and heavy d
engine applications. The original tri-metal bearing, a
developed by Cleveland Graphite Bronze, has been sup
seded by our subsequent technological advancements.

This type bearing is *old*, produced for many years at
rate of four million a month with excellent performance.



ENGINE BEARING REPLACEMENTS

s *new* because this is the first time this bearing has been ailable for use in the EMD engine.

he nickel barrier stops tin migration from the overlay. is produced by adding a micro layer of nickel between the erlay and copper-lead layers. This increases bearing life cause it enables the overlay to withstand corrosion at all mes. The abrasion resistance and surface action of the erlay maintain new bearing quality at all times.

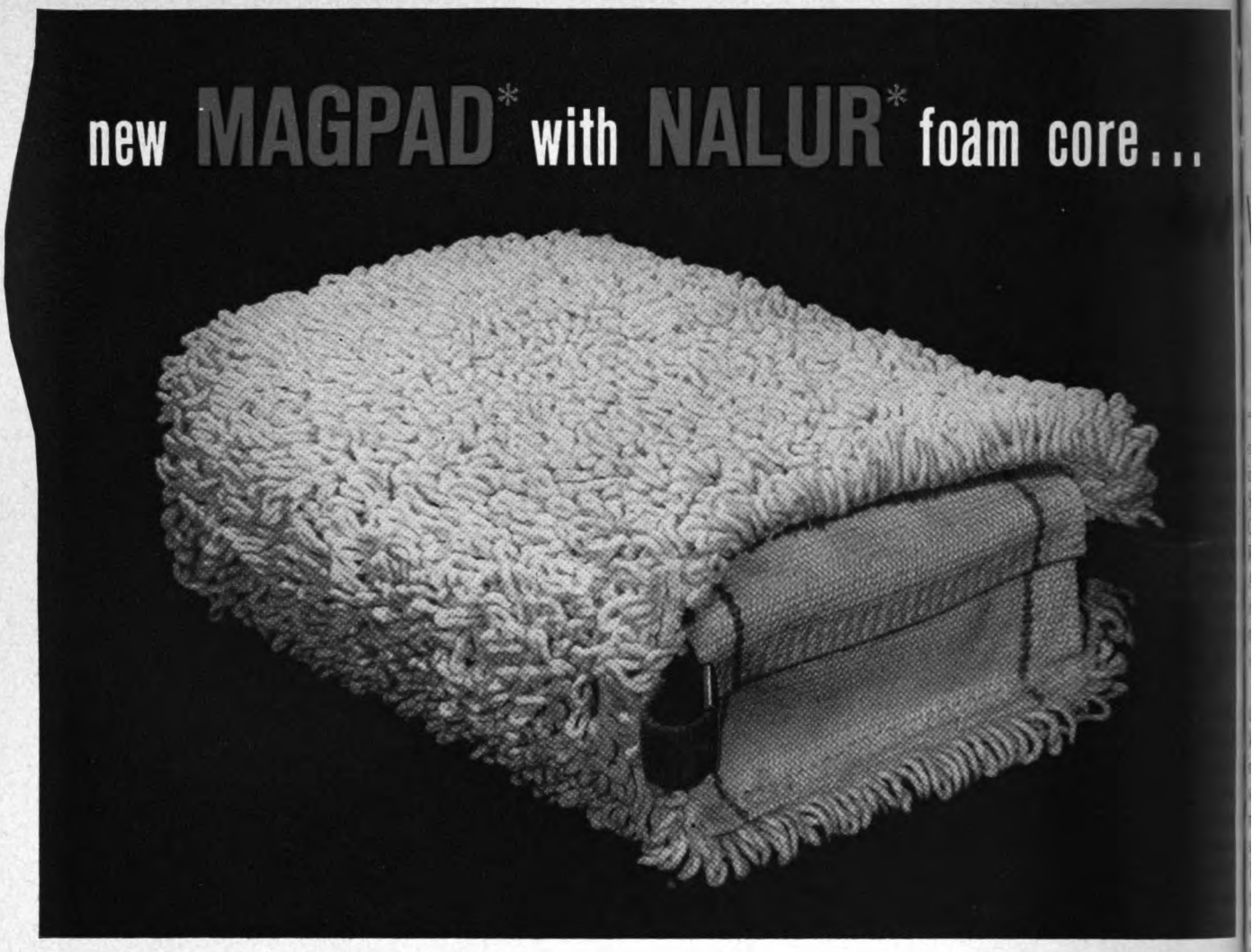
opper-Lead-Tin overlay: Fatigue life of the overlay is creased substantially by the addition of 3% copper in the recision electroplated overlay.

Improved—yet the cost is less! Only Cleveland Graphite Bronze can offer this improved four layer bearing. Take full advantage of this product that combines product improvement with cost reduction. Start extending your engine bearing life today. Cleveland Graphite Bronze, division of . . .

CLEVITE

17000 St. Clair Avenue • Cleveland 10, Ohio
In Canada: Clevite Ltd., 1177 Talbot, St. Thomas, Ontario
Also manufacturers and distributors of the Clevite Journal Bearing Cartridge.

new MAGPAD* with NALUR* foam core...



a low-cost lubricator that also has internal wicking and lock-stitched tufted cover

The heart of the new MAGPAD is NALUR—a specially formulated acrylonitrile foam rubber developed and produced by National Lead Company. It is highly resilient, has low oil swell characteristics and excellent resistance to compression set at high temperatures.

Outer cover is a heavy high-quality chenille, lock-stitched to withstand a 10-lb. minimum pull on tufts. End closures are tough cotton belting.

Ample internal wicking is provided by 25-ply candlewick routed through ½" vertical orifices to provide unrestricted flow of oil.

Renovation—The MAGPAD with NALUR is sturdily made—its rugged construction permits renovation by any standard method in railroad use.

Get the full story on the new *low-cost* MAGPAD with NALUR. Ask our representative or write for details. Magnus Metal Corporation, 111 Broadway, New York 6, New York or 80 E. Jackson Blvd., Chicago 4, Illinois.

**Trademark of National Lead Company*

MAGNUS METAL CORPORATION
Subsidiary of NATIONAL LEAD COMPANY

GEARED TO PROGRESS P I R I MEMBER

What's Ahead in Railroad Equipment?

Technological progress in motive power and rolling stock may not be coming rapidly enough, research groups told

"The function of technological change on the railways is to keep the railways in business in the future," Dr. O. M. Solandt, vice-president — research, Canadian National, recently told the Railway Systems and Management Association in Chicago. He was making a plea for a greatly expanded railroad research program, asking that it be done by a cooperative agency.

Among those concerned with industry efforts at developing cars and locomotives which will maintain and improve the railways' competitive position there seems to be general agreement that more should be done—and some say it should be done faster. These ideas were expressed not only at the annual RSMA session, but also a short time earlier at a Railroad Research Seminar sponsored by the Association of American Railroads and the Armour Research Foundation.

At both meetings speakers outlined specific problems which should be the goals of equipment researchers. Targets of an extended research endeavor should include:

- New types of prime movers;
- New types of freight-car trucks;
- A fully automatic freight car coupler;
- Agreement on rail-highway container systems.

Several of these are discussed in detail on the following pages.

The total expenditure on railway research in North America is pitifully small," Dr. Solandt warned. "Failure to do research could lead to a failure to make necessary technological changes in time and lead ultimately to disappearance of the railways . . . While there are local differences, the basic problems are common to all railways. The AAR or some other cooperative agency [should] set up a vastly expanded research program to be paid for by the railways on some assessment basis and probably with substantial government help. An initial budget of $10 million a year, a useful target, would represent one-tenth of one per cent of the gross revenues of the railways. Many industries consider that they must spend from 1% to 5% of their gross revenue on research to remain in business."

Dr. Solandt indicated that technical problems constitute but one of three general areas in which failure to produce adequate solutions could have serious consequences. "Progress must be made on all three fronts simultaneously," he said, classifying the other two categories as "environmental factors" involving regulation, taxation, and subsidized competition, and "labor problems."

"The railway freight business has great potential," he continued. "Even now it supplies large volume, long distance land transportation much more cheaply than any competitor on wheels. The superiority is due to inherent advantages, including fuel and crew costs, which cannot be overcome by any foreseeable technical means except pipelines."

"The inherent economic and engineering advantages of the steel wheel operating on the steel rail are such that the railroad industry can forge ahead if only the full potential of this mode of transport will be exploited," A. J. Gellman, director of planning for North American Car Corp., told the RSMA. "Technological change has a tremendous and indispensable role to play in the American railroad industry if only it is given the opportunity to do so . . . Means must be speedily established through which proposals for technological innovation can be skillfully and independently evaluated. Changes deemed worth adopting industry-wide must be made part of the standardized rules governing intercarrier relationships."

Mr. Gellman agreed with Dr. Solandt that barriers to technological change exist both outside and within the industry. A principal barrier is "the basic organization of U.S. rail carriers—the large number of corporate organizations which must work together," he said. "Because of the necessity for standardization due to interchange, the railroad industry should be on its toes to assure that standardization does not prevent introduction of technological change."

The industry also fails to take a systems approach to its problems, he warned. Mr. Gellman cited the failure of many railroaders to appreciate the relation between rolling stock developments and per diem or mileage compensation for car owners. "How can a tank car owner justify spending more money on a tank car which will do a better job for his customers—and keep them happy with rail transportation—when a much less expensive tank car doing a barely adequate job will return to the owner just as much revenue.

"Railroad equipment design, both locomotive and car, is far from stagnation," P. V. Garin, manager of mechanical engineering and research for the Southern Pacific, told the AAR-ARF session. "Equipment designers on the railroads and at the builders have already entered into many new and promising concepts and improvements. The future can only see an acceleration of these ideas." At the same meeting R. M. Coultas, manager of domestic locomotive sales for General Electric discussed potential motive power sources. "Whatever direction developments may take, we can be sure that the locomotives of the future will make a major contribution to increasing economy of railroad operation and improved service to shippers . . . The future presents a challenge and opportunity for technological progress that may well revolutionize railroad motive power."

Design for Automation

O. M. Solandt, Canadian Nation

AUTOMATION. We now accept automatic vertical transportation in our large buildings without question. There seems to be no reason why similar techniques cannot be applied to horizontal transportation. It will be a long time before we have automatic train operation on our main lines, but it is already beginning to appear in special cases. Because of the gradual way it will be introduced, it is unlikely to prove a threat to the livelihood of existing train crews but may well limit employment in this field in the future.

FREIGHT CARS. The railway of the future . . . depends on cheap, reliable and widely available means for transferring loads from road to rail and from rail to road. Innovation and experimentation in this field are already very active. With intelligent cooperation, the railways should soon settle on a small number of compatible techniques for piggyback and container operation which will meet this need. . . . There should be a continuation of the present trend toward the use of an increasing proportion of specialized freight cars, containers and trailers. Experience shows that in spite of higher capital costs, these cars can lower total transportation costs by reducing handling costs and delays, and by avoiding damage.

CAR TRUCKS. If the railway future lies in long-haul freight business, the most fundamental need is for a low-cost, thoroughly reliable freight car truck requiring a minimum of maintenance and very infrequent inspection. Th will require radical changes in the basic design of the tru and improvements in all components such as bearin brakes and wheels. The solution to the bearing proble lies in good engineering or an integrated truck desig Freight car bearings are expected to operate under ve bad conditions and it is surprising not that we have ho boxes, but rather that we have so few. Improved reliabil of all the components of the freight-car truck is essent to safe and reliable automatic train operation.

AUTOMATIC COUPLER. Another step that must b taken toward automatic train operation is development a reliable automatic coupling that will couple the air ho without human intervention. When these and a few oth problems are solved, automatic train operation shou prove quite practical.

MOTIVE POWER. The nuclear locomotive using e isting cycles of transformation of nuclear energy to hea heat to steam, and steam to electricity or mechanical e ergy has no economic future. There is no reason to belie that such a locomotive would have any economic or tec nical advantages over existing diesels. Several possibilitie for direct transformation from nuclear energy to electricit are already in sight and may alter the picture. In the mear time, we have the possibilities of direct-drive gas-turbin gas producers available for exploration.

Optimum Locomotive

P. V. Garin, Southern Pacifi

OPTIMUM LOCOMOTIVE SIZE. After a number of years of experience with diesel-electric motive power, railroads are again faced with the problem of re-evaluating the characteristics of a locomotive unit to meet present-day demands. In the final years of steam locomotive operation, we saw the packaging of more and more horsepower in each individual unit. With the advent of the diesel-electric locomotive, a new "building block" concept was introduced. The size and output of the diesel engine at the time of its introduction limited the capacity of each individual unit. The original freight units were rated at 1,350 hp and, where greater outputs were required, multiple-unit consists were used. Although involving investment in additional units, this does permit greater utilization and does not require tying up of extra horsepower should one unit need repair. The flexibility in gearing of diesel-electric locomotive has also provided a broad range of performance characteristics for the railroads.

The American railroad diesel has grown in output over the years. The original road diesels rated at 1,350 hp for traction have been gradually increased in horsepower until today single units of 2,500 hp are available—understandable when considering the demands for higher speed and greater tractive effort. With higher horsepower, problem of maintaining satisfactory adhesion characteristics hav been aggravated. The factor of adhesion now limits th output available from a controversial diesel-electric unit

This raises the question as to just what is the practica optimum output of a single locomotive unit to meet th demands of modern railroad service. In some cases, in creased output from the same basic engines results in ad ditional maintenance expense. In others, if more horse power than required is assigned to a given train, the motiv power is not utilized to its fullest capacity. A high outpu unit tied up for inspection or repairs removes much mor potential horsepower from service. Proponents of high horsepower units indicate that a greater output per uni results in a reduction in the number of units required t move a given train, eliminating a proportional number o wheels, traction motors, gears and other wearing parts which contribute to maintenance expense. Investment in additional units, depreciation, and inspection costs are also decreased. It would seem, with increasing demands for faster schedules and higher speeds, the advantages of ob taining additional output from locomotive units outweigh the disadvantages, if the additional output can be utilized

roductively and there are no offsetting maintenance conderations.

While the diesel-electric locomotive has been a major dvancement, some criticisms levelled at it include its low orsepower capacity per unit, the weight per unit as reıted to the capacity, the limited factor of adhesion, the igh initial cost in proportion to the horsepower capacity, ıe high level of maintenance expense, and the relatively ıort economic and service life. These criticisms are being ctively debated today. Regardless of the arguments, there . no doubt that many railroads are facing a time of deciion as their present diesel fleets get older. This decision ıust involve whether to rebuild locomotives in kind, reower them with higher capacity engines, or look for a ifferent type. There must also be a decision as to the opmum size of the future locomotive unit.

MAXIMUM FUEL ECONOMY. Another major deision must be reached on the motive power that has maxnum fuel economy. When the diesel locomotive entered ıe American railroad picture, high-grade distillate fuel ‘as relatively cheap and plentiful. Competition for this etroleum fraction for jet airplanes, the military, and doıestic heating oil has increased the price of diesel fuel reatly. It is to the benefit of the railroads to operate loomotives on cheaper fuels, because fuel cost represents high percentage of locomotive operating expenses. While ıuch research has been done to enable current designs of ngines to burn less expensive fuels, there is need that fuur developments in locomotive engine design provide this eature from the start.

FOREIGN MOTIVE POWER. In Europe, particuarly in Germany and Great Britain, the diesel-hydraulic ocomotive has been developed to a high degree of perection. Recently, two American railroads have purchased liesel-hydraulics designed to meet the requirements of J. S. operation. These units have been placed in service ınd are currently undergoing evaluation tests to develop heir capabilities under the most rigorous demands of servce. . . . Whether this development, which replaces electric lrive with the hydraulic transmission, will prove itself on lomestic railroads remains to be seen. However, no posiible improvement should be overlooked at this time of lecision on future motive power. Equipment builders and :he railroads will watch with interest the results obtained with these German-built diesel-hydraulic units. If their performance and design prove successful, arrangements could, no doubt, be made to manufacture this type of equipment domestically.

GAS TURBINES. Success of gas-turbine-electric locomotives on the Union Pacific is well known. These units, producing as high as 8,500 hp, have been assigned to heavy freight service where their characteristics can be best utilized. Experimental work has been done on the free-piston gasifier type unit with an electric drive, but, unfortunately, development of this design has not progressed to the point where road tests have been made and performance evaluated.

ELECTRIFICATION. Electrification cannot be overlooked. On most European railroads, electrification is the ultimate goal of long-range planning for high-traffic-density lines, with dieselization confined to lower density, secondary routes. In this country, electrification has been identified with high investment cost in structures and catenary systems. Recent developments might lead eventually to economical electrification on certain sections, such as heavy mountain grades. Electric locomotives have been developed which are capable of producing high horsepower and utilizing current from the commercial frequency distribution network. The most modern European locomotives develop as high as 6,000 hp per unit and are equipped with silicon rectifiers to convert the commercial frequency current to direct current for traction purposes. Plans indicate that as much as 12,000 hp could be incorporated in one unit of reasonable length. Where high horsepower is necessary, electrification cannot be ignored.

NUCLEAR POWER. While design of a nuclear-powered locomotive is probably possible, safety aspects of a fission-type power reactor aboard a locomotive present some rather formidable problems. The logical application for nuclear power in the locomotive field would be to generate power by this source at a central plant and transmit it at commercial frequency to locomotives through an overhead wire. This would eliminate the dangers of operating reactors in densely populated areas. European and Russian specialists seem to agree with this concept of the use of nuclear power, particularly in fuel scarce areas.

There are other possibilities in locomotive design which are worth mentioning. Domestic diesel engines meeting locomotive space and weight restrictions are being developed with outputs as high as 4,500 hp. A gas-turbine-

Immediate Future

While 1961 saw fewer new freight cars put into service than any year since 1939, and although last year was also one of the poorer years for new car orders, there was cautious optimism among carbuilders at year end. Among the approximately 30,000 cars ordered in 1961, a large percentage were of designs that were unknown five years ago. "It appears the carbuilding market for the immediate future will continue to be characterized by the need for smaller lots of the many new special purpose cars developed by carbuilder research in recent years," J. W. Scallan, Pullman-Standard president, commented recently. "The demand for piggyback equipment and flat cars equipped with tri-level and bi-level racks should continue to grow in 1962. Although the broad use of containerization is, perhaps, some way off, interest in individual systems could be translated into orders during the year. We are quite optimistic about the market for special-purpose box cars. . . . Special type covered hopper cars could also provide a market in 1962. . . . There is no doubt that all of us connected with railroading have seen a veritable rolling stock revolution in recent years. . . . As a carbuilder, we now think of cars needed for handling materials for whatever type of rolling stock will help the shipper or receiver save money and will help our railroad customers get a larger share of the transportation market.

steam cycle locomotive is under development in Canada. The possibility of developing alternating current drives with frequency changers can be explored.

FREIGHT CARS. Cars capable of carrying a higher pay load with reduced weight offer incentives to shippers to use rail transport. Piggyback shipments have grown rapidly. Container shipments will continue to grow. This will require designs of carrying cars which will provide maximum flexibility, good protection to containers and lading, low tare weight, and minimum maintenance. Increased effort is needed to improve design of components, such as trucks and spring suspension, to meet these requirements. Possibly complete container trains will be operated without uncoupling en route—containers being handled by cranes at intermediate terminals. The flat cars would be kept running instead of standing at loading docks or in yards.

There is a definite trend toward higher loading of freight cars, which means that car designs must be reduced in tare weight. This is a challenge to the freight-car designers. Emphasis must be given to increasing pay loads and reducing dead weight. Limiting factors are wheel and axle loading. This may eventually require six-wheel trucks under some heavily loaded cars to reduce the rail loadin under each wheel.

TRUCK DESIGNS. While progress has been made in cushioning longitudinal shocks, more attention must b paid to vertical cushioning. This would indicate a nee for a more stable truck without so much lost motion an so many loose parts. The spring suspension system is vi tally involved. Studies of non-linear spring systems hav been made, but more must be done.

With the adoption of lubricator pads, commendabl progress has been made in eliminating hot boxes an burned-off journals. Performance will be further improve when other details of the journal box assembly compo nents have been altered. One promising field is reductio in axle displacement during impact. Most of the newe freight cars receive roller bearings as original equipmen This effectively minimizes journal problems on these car Future needs in wheel design are tied in with the develop ment of improved freight car trucks. With higher whe loadings, particularly on four-wheel trucks, wheel diam ter should be increased to reduce the loading per inch with in recommended limits. This will involve modifications i car and truck design.

Future Prime Movers

R. N. Coultas, General Electri

AUTOMATION. At present, the diesel-powered locomotive with an electric transmission has reached a high state of development. With the source of electric power used to drive the motors—the engine generator set—priced at about $40 per kw, any other power source has a formidable economic obstacle to overcome.

Railroad mergers, competitive pressures, and technological improvements all tend to increase the density of traffic on a given set of rails, putting increased premium on high horsepower, greater reliability, and automation developments. An engine which has proved to be highly reliable at a certain horsepower rating may not perform as well when the rating is stepped up. Automation, if assumed to include a limited crew or no crew at all, requires an even higher degree of reliability than is necessary in today's locomotives. This introduces dual problems of increasing both reliability and rating.

GAS PRODUCER. When turbosupercharged diesel engines of a physical size customarily used in locomotives reach a rating of about 3,800 gross horsepower, useful power output at the crankshaft, output power of the turbocharger turbine, and input shaft power of the compressor are all approximately equal. The question then arises as to where the useful power can best be extracted from the engine—from the crankshaft in the conventional manner, or from the turbine. Driving the axles directly from the turbine has attractive aspects. Energy transformation takes place only twice: first from chemical energy of the fuel to kinetic energy of the hot gas, then to mechanical energy at the wheels. By eliminating the extra steps of converting to electrical or hydraulic energy an back again to mechanical energy, efficiency can be in creased approximately 15%. In fact, the transmission i the ordinary sense can be practically eliminated.

A locomotive constructed to this cyclic configuration ha been built in Sweden and operated by the Swedish Stat Railways (RL&C, May 1956, p 67). At 1,350 hp, it i too small for use on U.S. railroads, but it demonstrate the feasibility of such a design. A gas-producer, gas-tur bine locomotive suitable for U.S. railroads might be a four-axle unit with a loading of 65,000 lb per axle. A direct-drive gas turbine has 2 to 1 ratio between peak ef ficiency torque and stalled torque. Considering 30% ad hesion as the limiting starting condition, the minimum power level practical on a locomotive with 65,000 lb axl loading is 800 hp input per axle. A four-axle locomotiv would require 3,200 turbine output horsepower, or abou 3,800 hp from the gas producer. This is within the prac tical range of development of present locomotive diesel engines. An analysis of the gas-producer cycle indicate that the most promising path of development is that o evolution from the diesel engine to a crankshaft-driven compressor gas producer. Other forms of gas producer are not competitive. Many problems are involved in de veloping such a locomotive to the level of reliability neces sary for successful U.S. mainline freight service, but they do not require any breakthrough in thermodynamics o metallurgy.

GAS TURBINE. Current economic and technological factors do not favor further development of the gas-tur

bine-electric locomotive for general use. Where conditions suit its characteristics, it has a field of usefulness. A problem particularly troublesome to those who tried to burn coal in a gas turbine has been fly ash in the gas, causing rapid erosion of the turbine parts. A new scheme for overcoming this problem is to dissolve the coal in a hydrocarbon solvent. The ash does not dissolve and can be filtered off. The remaining solution is precipitated as pure coal, fine as flour, and containing no ash. It should make an admirable fuel for a gas turbine and, possibly, a diesel engine. Extra treatment of coal would make the scheme decidedly uneconomical except that some of the constituents are distilled off and can be sold separately, making ash-free coal reasonably competitive.

NUCLEAR POWER. Atomic energy continues to be discussed from time to time as a source of locomotive power. At present, however, the economic and technological factors are still beyond a practical solution, and they may very well stay that way for the foreseeable future.

A nuclear-powered locomotive would have to be completely shielded. It would have to run through towns and cities and could not take refuge at sea or at high altitudes as is the case with the atomic submarine and as was to be done with the now-abandoned atomic plane. Regardless of the hazards of a locomotive application, the cost of the power plant and the cost of the fuel are both far in excess of corresponding figures for today's diesel-electric power plant. Most proposed nuclear plants for locomotives also involve several energy conversions.

FUEL CELL: Another energy source potentially applicable to locomotives is the fuel cell, now becoming more commonly known as the fuel battery. Somewhat similar to a conventional battery with each cell having an anode, a cathode, and an electrolyte, the fuel battery is continually recharged with a conventional fuel. The fuel cells which are furthest advanced in engineering development today use hydrogen as the fuel. A tremendous incentive exists to use hydrocarbon fuels directly in the fuel battery, since only with such a fuel can electrical energy be generated at low cost. Present estimates indicate hydrocarbon sources can provide hydrogen fuel at lowest cost in installations above 1,000 kw capacity.

One of the virtues of the fuel battery is that, unlike all heat engines, it is not limited in theoretical efficiency by the Carnot cycle. Its practical efficiency lies in the 60 to 80% range. However, if hydrogen must be made, the Carnot cycle efficiency does apply, because this is a heat process.

In making a survey of possible locomotive power sources, cognizance must also be taken of some of the more exotic means of producing electricity—thermoelectric and thermionic devices and the magnetohydrodynamic process. All have fantastic costs per kilowatt.

ELECTRIFICATION. The power source that today, and the foreseeable future, best meets the demand for more horsepower, greater reliability, and adaptability to automation is the second oldest in railroad history—electricity, delivered to the locomotive from a wayside generating station via an overhead system.

Far higher horsepower per unit can be achieved because each locomotive need not carry its own power plant. Diversity of loading means that the required central station capacity need not be as large as the sum of the diesel power plants it replaces. Reliability is greatly improved by virtue of the very nature of large central station generating apparatus. Certainly, nothing will lend itself to automation more readily than an electric locomotive which has no diesel engine with its many auxiliary systems to be watched and tended.

The silicon rectifier, just beginning to be used in railroad electrification, offers several advantages over the common mercury-arc rectifier. Because it needs no firing circuit, the allied circuit complexity is reduced and, because it can operate at a high temperature, air cooling is satisfactory. Overall efficiency is also slightly higher for the silicon rectifier.

Considerable progress has been made over the last several years in the art of reducing the susceptibility of communication circuits to trolley-rail currents. This means that any new electrification can be at the standard commercial 60-cycle frequency. Because of the vast size of today's power networks, it would seem reasonable that, in most parts of the country, the single-phase load resulting from railroad electrification would not cause harmful unbalance even at peak hours. Thus, separate railroad power plants or phase conversion equipment would not be required, and favorable power rates could be expected.

Both nuclear power plant and the fuel battery power plant would lend themselves very readily to electrified railroading. They could be placed in wayside stations where any health and safety hazards could be carefully controlled and where efficiency would not be unduly penalized either by keeping the unit within certain weight and dimensional limits. All of today's applications of nuclear energy power sources involve powering a turbine which could produce either alternating or direct current. The fuel battery is a direct-current source. It offers the possibility of a multiplicity of cells connected in series to form a high-voltage fuel battery which could deliver direct current to the catenary to be utilized by direct-current motors on the locomotive. This might be a very attractive means of operating a railroad from the standpoint both of reliability and efficiency.

Until the economic picture changes sufficiently to justify electrification either through increasing traffic density or relative changes in energy costs, the diesel-electric locomotive will remain the prime source of railroad power. Even here, many of the benefits of electrification can be achieved with high horsepower-per-axle units having a minimum of complexity and a built-in freedom from the biggest hazard of all—dirt. The advances in design will bring maintenance costs down from the present level of the conventional locomotive, though, since the diesel engine is still present, they can hardly hope to approach those of a straight electric locomotive.

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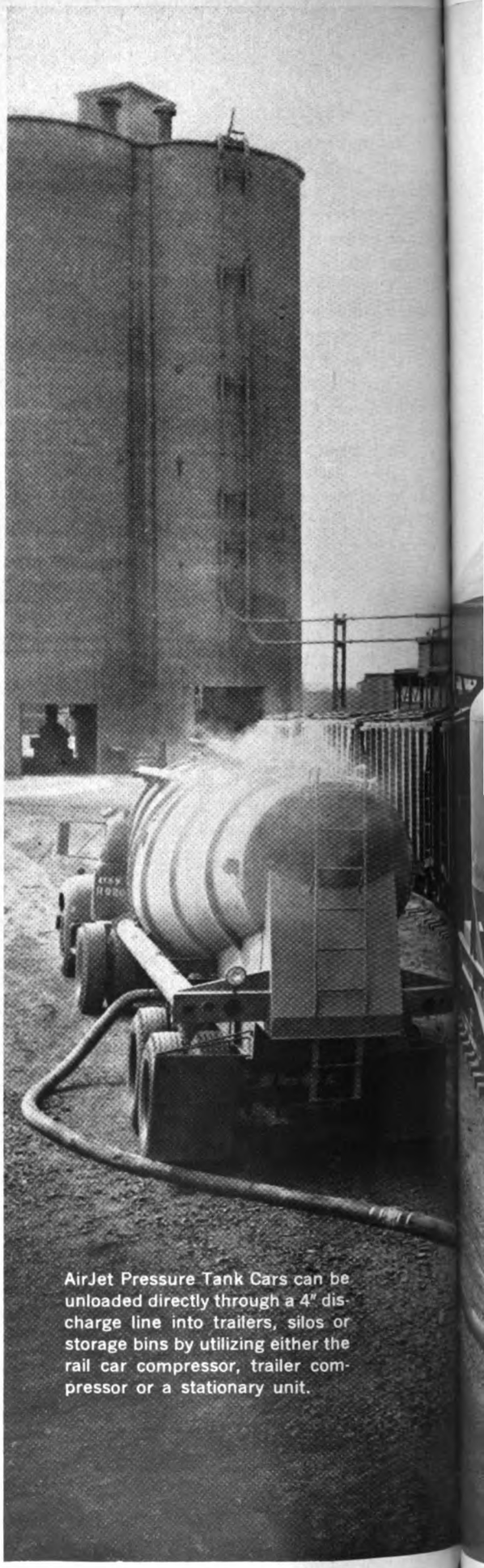
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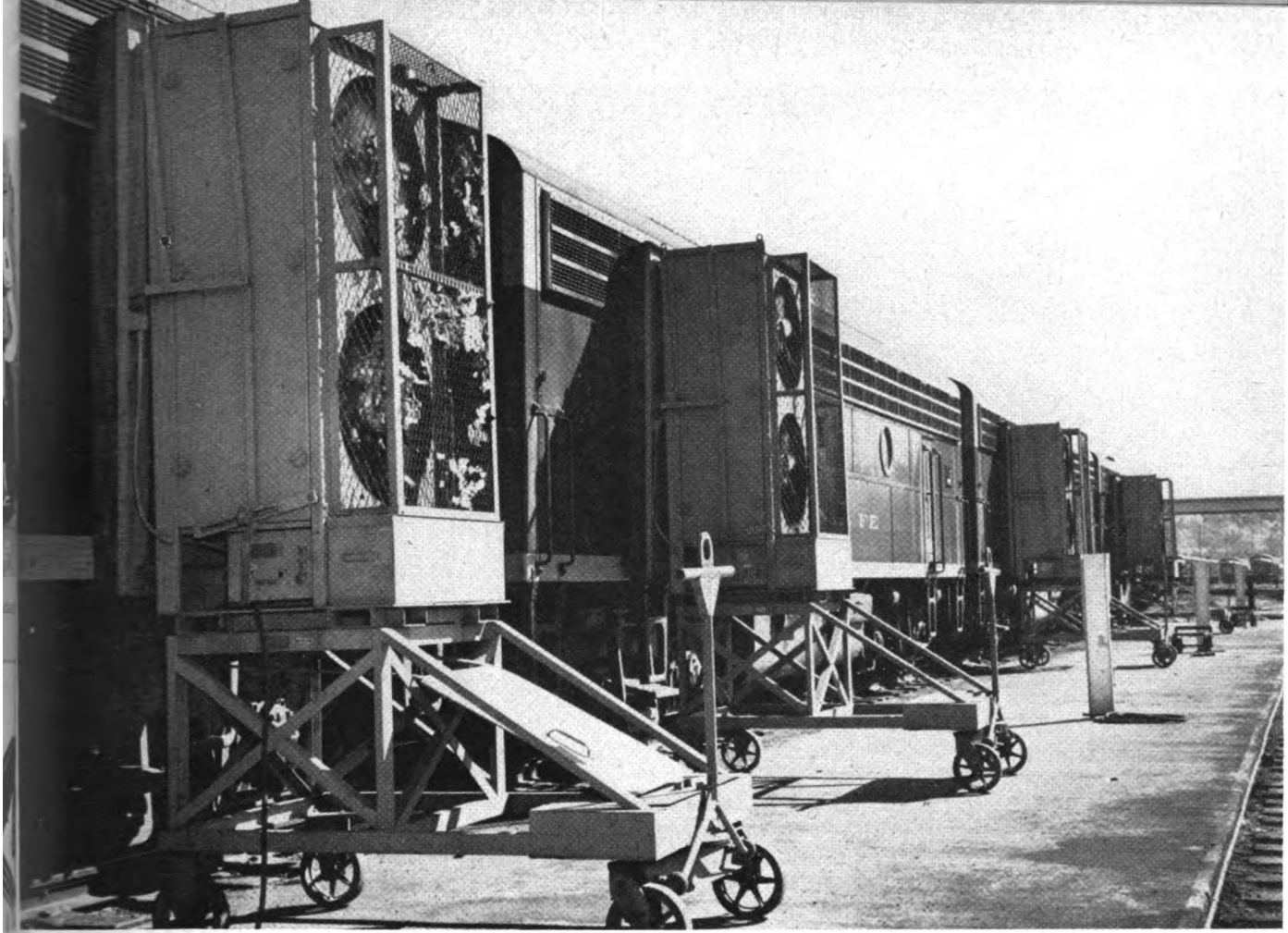
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Air cleaners positioned for locomotive cleaning at Argentine, Kan. Units can be cleaned at the same time, or individually.

Santa Fe Speeds Diesel Cleaning

High velocity cleaning machines, working on the exhaust fan principle, are now used by the Santa Fe for cleaning diesel locomotives at Argentine, Kan.; Cleburne, Tex.; Barstow, Cal., and San Bernardino, Cal. Each cleaner has a pair of electrically powered 24-in. fans operating at 1,850 rpm to pull air from the locomotive carbody at a rate of 33,000 cfm. This carries all refuse, dust, and dirt outside into the fan housing. The former practice of using only an air hose served to move dust and dirt from one place to another in the engineroom. The powerful suction developed by the LMC car cleaner now removes all this debris from the carbody.

The car cleaner, a product of the Farr Company, was developed jointly with the Santa Fe.

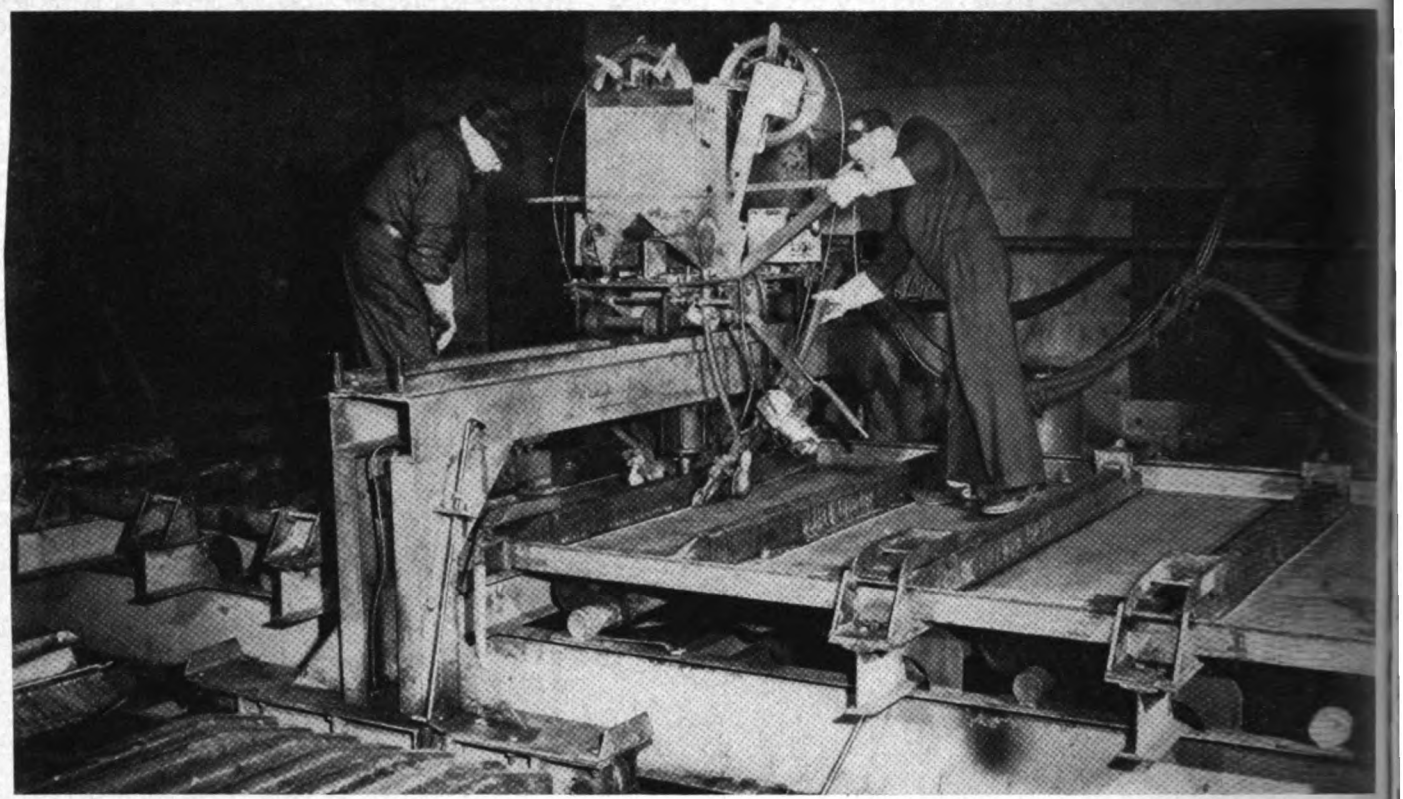
These cleaning units are the same type used by the Santa Fe in its 21st Street coach yard at Chicago for cleaning passenger cars (RL&C, Feb. 1961, p 20). They have been found to do an equally efficient job in diesel-electric locomotive enginerooms and electrical equipment cabinets.

An example of their use is at the Santa Fe locomotive terminal at Argentine where five cleaners operate on a three-shift basis. The machines are spaced along the cleaning track so a multiple-unit locomotive can be conveniently spotted for cleaning during monthly inspections, or oftener if necessary. Incoming units are positioned on the cleaning track before being moved into the diesel shop. A cleaning machine is then positioned against one of the carbody side doors of each unit by a man who also plugs the cleaners in wayside electrical receptacles. Release of a lever on the cleaner frame moves a sponge rubber and canvas diaphragm against the engineroom door to insure that the fans will draw air only from inside the carbody.

Units are normally cleaned one at a time by a man who blows the radiators, motors, main and auxiliary generators, electrical cabinets, and engineroom floor with an air hose equipped with a nozzle. Cleaning time for each unit is about 20 min. If the m-u locomotive is on short time for turnaround service, a man is assigned to each unit for simultaneous cleaning.

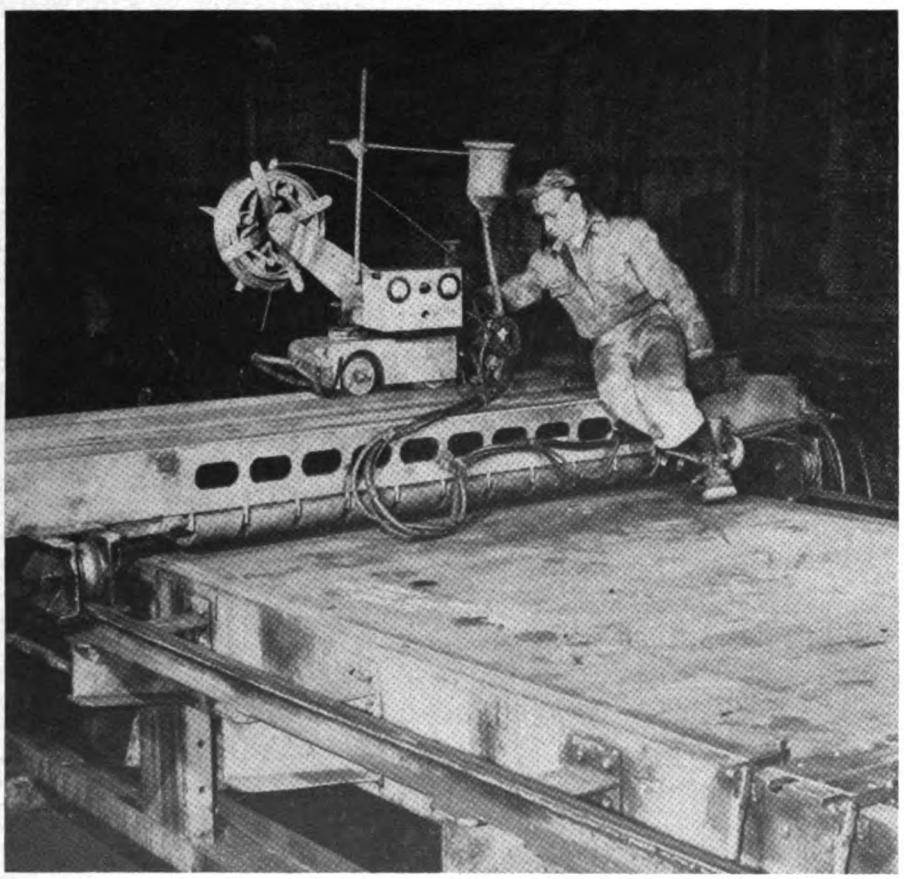
Carbody units with aisleways on both sides have been found to be cleaned most effectively with the LMC cleaner. Special adapters are applied when it is used for road switcher locomotives. The cleaner is placed at the cab end against an opened door of the short hood which houses the air-brake equipment. The trap door of the cab floor is raised to clean the interior of the cab. After this door is put back in place, two doors on the front hood are opened and the hose used to clean engineroom and associated equipment.

The same cleaning procedure is followed with five machines installed at Barstow. In addition, enginerooms are spray cleaned with a solvent emulsion cleaner mixed with kerosene. Heretofore, spraying was slow because of the heavy fume concentration.



Twin-head unit simultaneously welds both fillets joining pressed side stake to the hopper-car side assembly.

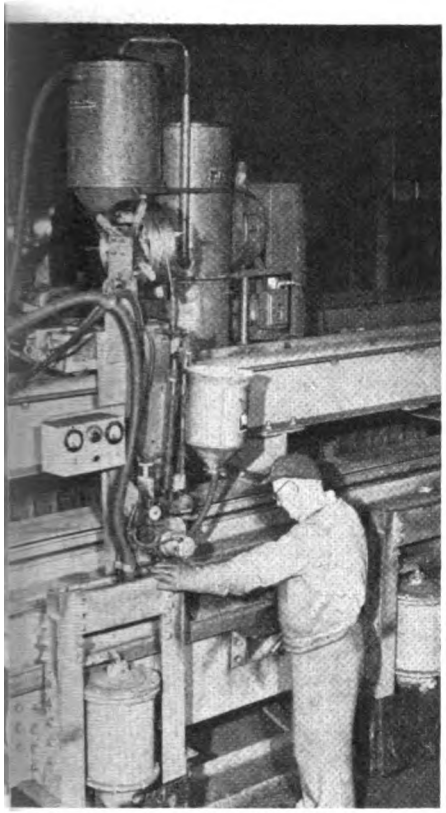
Welding Used for Hopper Assembly



Unionmelt DS head on Oxweld CM-37 machine carriage butt welds hopper-car side sheets.

The New York Central shop at East Rochester, N. Y., has recently been producing six 70-ton hoppers and two 50-ton box cars a day. Standardized car components and welding procedures, along with specialized fixtures, were important in achieving this sustained output. While standardization is today's byword for all phases of railroading, perhaps the best example of standardization may be found in the car shops. Many standard components are received from basic suppliers. These are then combined with fabricated assemblies. Automatic and semi-automatic welding, combined with mechanized positioners, play important roles in assembly.

The New York Central owns more than 28,000 open-top hoppers—25% of its freight car fleet. The Central is now concentrating on the higher capacity cars, having taken delivery of its last 55-ton hoppers in 1953. Of the roads 8,850 70-ton hoppers, 75% have been built since 1955. Large scale retirements of old cars are cutting maintenance costs and the improved designs of the new cars are introducing additional economies. For example,



Bulb angles are applied with two heads.

the road developed its own specifications for the 70-ton, all-welded hopper which it orders. According to J. H. Heron, assistant vice-president-equipment, this hopper has proved itself in competitive impact and shake-out tests. Being lighter, it also has greater lading capacity than comparable riveted designs.

While the NYC has ordered some of these hoppers from carbuilders, many of them, as well as other types of freight cars, are constructed at the East Rochester shop for the account of Despatch Shops, Inc. Latest building program involving 70-ton hoppers at Despatch shops ended in July.

Welding Procedure

Welding procedures utilizing Linde manual and mechanized Unionmelt welding equipment, have been standardized at Despatch shops to simplify production of the many components for these cars.

The $\frac{5}{16}$-in. side sheets are butt welded in a gantry fixture, using a Unionmelt DS head and Oxweld CM-37 machine carriage. The gantry straddles the side-sheet assembly running on rails along both sides. The welding carriage moves laterally along the "bridge" at a speed of 26 ipm for mechanized welding of the close-butt joints. Weld current is 550 to 600 amp at 28 volts, d-c. Oxweld 29 wire, $\frac{5}{32}$ in. diameter, and Unionmelt Grade 50 compositions are used. Weld back-up is ¾-in. by 3-in. copper bar.

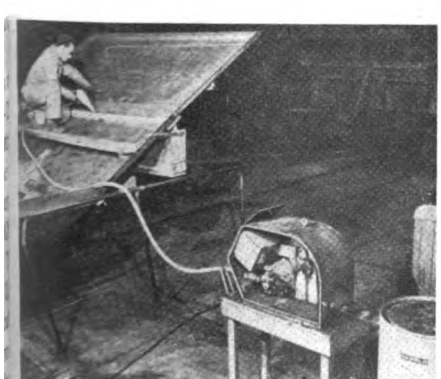
Top and bottom side angles are attached to the side sheet assembly on another fixture which has two DS welding heads, each on a CM-37 carriage. The top bulb angle is 5 x 3 x ⅜ in., while the bottom angle is 4½ x 3½ x ⅜ in. Pneumatic clamps position the parts, and welding conditions and materials are nearly identical to those used in the side-sheet welding. The copper back-up bar runs the full 40 ft behind the joints. A vacuum-hose recovery unit picks up any composition which remains unfused.

Another twin-head unit, this time using two DS heads on a single CM-37 carriage, welds stakes to the side-sheet assembly. The gantry fixture can move rapidly from stake to stake. The twin-head welding carriage simultaneously welds both side fillets at a speed of 40 ipm. A pneumatic clamp mounted on the crane holds the work in position. Copper back-up is a ½- x 2-in. bar. Welding conditions and materials are similar to those of the previous process, except that current is reduced to 500 to 550 amp.

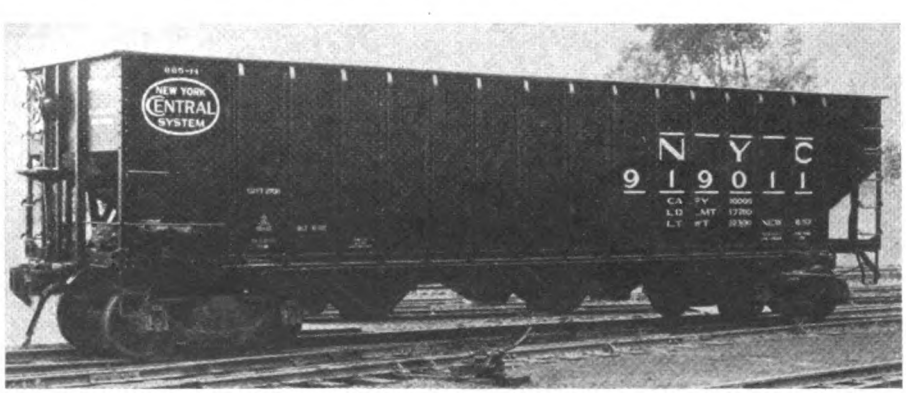
Slope sheets, $\frac{5}{16}$ in. thick, are manually welded, using two UWM flexible welders. These portable machines bring submerged-arc-weld strength, speed, and quality to joints unsuitable for mechanical welding. Welds have been found to be superior to covered-electrode welding in depth of penetration and smoothness. Welding is done at a speed of 16 ipm, using No. 29 wire, $\frac{3}{32}$-in. diameter, and Grade 50 composition. Weld current is 500 to 550 amp at 35 volts, d-c. Butt or lap joints are used, with a steel strap or sheet serving as a back-up. A wooden strip lined with asbestos acts as a dam for the granular composition.

Center-sill assembly utilizes dual Unionmelt UE welding heads on a CM-37 carriage. Two 51.2 lb per ft AAR Z-sections, 41 ft long, form the sill and serve as a track for the welding carriage. An Oxweld W-17 oxyacetylene torch, mounted 4 ft ahead of the welding heads, dehydrates and cleans the butt edges of the joint. The lead electrode operates at 700 amp, 29 volts, d-c, while the trailing electrode is set at 725 amp, 35 volts, a-c. Other portions of the hopper underframe are assembled with welding. Striker castings, filler blocks, sole plates and draft-lug castings are attached to the center sill at the next welding station. Bolster center plates and side bearings are then welded to the sole plates. Braces, sheets and stiffeners are applied at the next two assembly stations. In all, six flexible welders are used in these operations. General welding conditions are: power, 500 amp at 35 volts, d-c; speed, 16 ipm; materials, No. 29 wire, $\frac{3}{32}$-in. diameter and Grade 50 composition. Welding positioners, or clamps and tack welds, are used to hold the parts in place.

Completed car has a light weight of 52,300 lb. It is 41 ft 8 in. over strikers, has a height of 11 ft 1 in. from rail to top side angle, and a capacity of 2,700 cu ft.



Unionmelt flexible welder is used to butt weld $\frac{5}{16}$-in. slope sheet at 16 in. per min.



Testing has proved strength of these 70-ton, triple-hopper cars which New York Central builds at its East Rochester Shop using Unionmelt welding.

GTW Completes Diesel Shop

Conversion of road's steam shop provides both diesel servicing and heavy repair facilities

Conversion of the Grand Trunk Western shop at Battle Creek, Mich., to produce an efficient enginehouse and heavy diesel repair facility has been accomplished over the past three years. The seven-track enginehouse in the west end of the former steam locomotive back shop went into operation on March 5, 1960. Today, the rebuilding of the remainder of this building for heavy diesel repairs is practically complete. There still remains some shop office construction, rearranging of some component rebuild areas, and relocation of the injector room and air-brake repair section.

The shop involved is a 613-ft x 170-ft building located adjacent to Battle Creek yard, an important classification point on the GTW main-line from Chicago to Detroit and Port Huron, Mich. The Grand Trunk Western, a subsidiary of the Canadian National, forms part of a through route from Chicago to Toronto. It has numerous branch lines across southern Michigan.

The GTW had many reasons for investing $1.5 million to modernize its Battle Creek locomotive facilities. The shop is near the center of the road's territory, and experienced manpower is available. The fueling, sanding, and inspection facilities put in operation at the same time as the enginehouse function as a centralized servicing point for all Chicago division road locomotives. The shop, itself, has ample room for expansion and is equipped with adequate crane facilities. While schedules call for shopping an average of 28 units annually over the next three years, GTW officers say they could quadruple this output with little or no change in shop layout. Partially mechanized overhaul lines could become full-fledged production lines because most of the equipment already is in place.

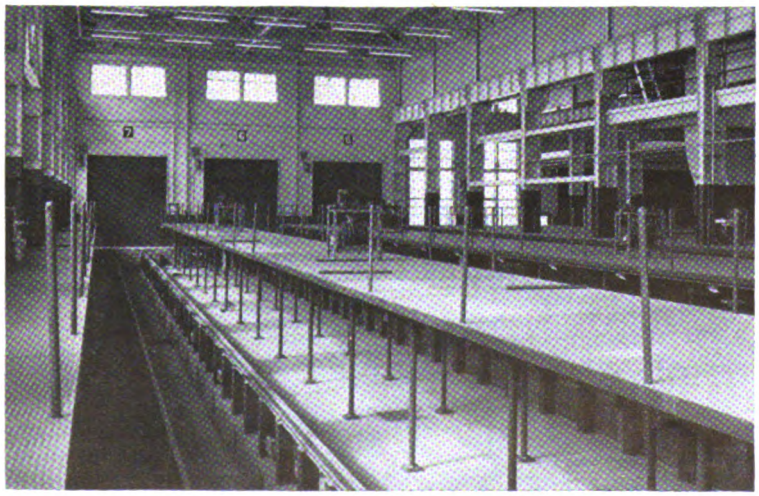
Separate Facilities

Although the enginehouse and heavy repair facilities are in the same building, separated only by a fire wall, the tracks in each are designated separately. Tracks in the enginehouse are numbered from 1 through 7. In the heavy repair shop there are pits numbered from 3 to 25.

Enginehouse tracks 1 and 2 extend over a single-unit center-release drop pit where emergency wheel and traction motor changeouts are handled. Tracks 3 and 4, holding two units each, are utilized for annual inspections, and for all engine work which can be done without removing the engine from the carbody. Running repairs and ICC periodic tests are made on Tracks 5, 6 and 7, each of which can hold three units. Tracks 3, 4, 5, 6, and 7 are equipped with conventional elevated and depressed platforms. An overhead platform between Tracks 3 and 4 makes it possible to work on roof-mounted equipment and on the top decks of the engines. All tracks are served by overhead cranes.

There are lubricating-oil dispensing stations, completely metered, at unit-length intervals along Tracks 5, 6 and 7, with one additional station between Tracks 3 and 4. The oil is circulated constantly at 45 psi, with screw-type pumps forcing it around a loop, including the dispensing stations, outside fueling facilities, and storage tanks. An automatic steam heater keeps the oil at from 100 to 120 deg F. Oil changes on the GTW are based on viscosity and flash tests taken twice a month. When crankcases are drained, the oil goes into another piping system, from which it is pumped into a tank car for reclamation. Oil for motor-suspension bearings is piped along the rails in the pits.

Water for cooling systems and steam generators is supplied by a 17,000-gal/day Zeolite plant. This treated water is pumped along all the servicing platforms. Blowdown for steam generators is piped outside through connections along Tracks 5, 6 and 7. Steam generators are acid-washed with a portable washing machine. Carbody filters of all locomo-



Three-level work area in enginehouse was built during conversion of GTW steam locomotive back shop. Between two nearby tracks is an elevated platform from which work can be done on locomotive roofs and roof-mounted equipment.



Washing and cleaning of the diesel units entering the shop are controlled from building at the right. A Vapor Senior up-grader is also available.



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Dispensing stations in enginehouse meter heated lubricating oil delivered to the engines.

tives are changed semi-monthly in the summer and monthly during the winter months.

There are exhaust hoods over all the enginehouse tracks. Air is removed from the shop by 33,000 cfm exhaust fans in these hoods. Controls make possible the discharge of stack gases from any individual diesel unit. Make-up air is supplied by a 70,000 cfm fan and is delivered in ducts to the pits.

There are powered roller-type doors at the seven track entrances and in the two doorways in the firewall between the enginehouse and back shop. Overhead shop lighting is provided with fluorescent lamps. Wide-Lite 1,000-watt mercury vapor lamps illuminate the outside servicing facilities.

Outside facilities for servicing include fuel and water stations, inspection pit, 20-ton sand tower, and a cleaning and washing station. The GTW uses pre-dried sand which is shipped and stored in 40-ton covered hopper cars. Twelve of these cars handle all the sand used by the GTW, not only at Battle Creek but at all other locomotive servicing points.

Heavy Repairs

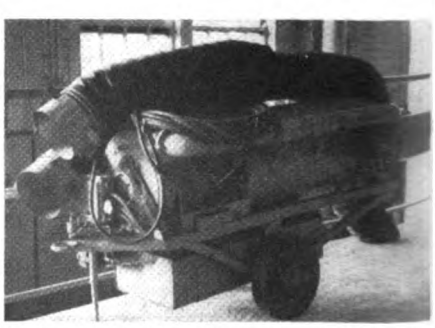
Heavy locomotive repairs on the GTW are based on mileage, with units scheduled to come to the shop at intervals varying from 250,000 to 400,000 miles. Repairs are classified as follows: Class 1—Any unscheduled repair; Class 2—Replacement of all power assemblies and overhaul of engine top decks and trucks; Class 3—Complete rebuilding of engine and main generator; Class 4—Complete overhaul of unit, including renewal of all piping and wiring.

GP-type road switchers are over-

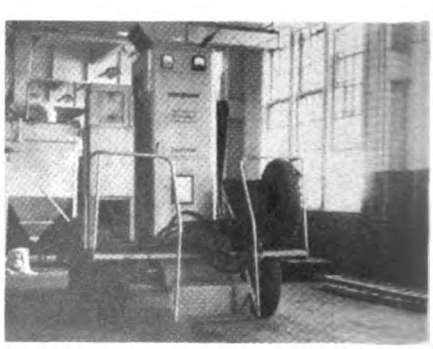
(Continued on page 36)



Electrical section benches are completely equipped for component testing and repair work.

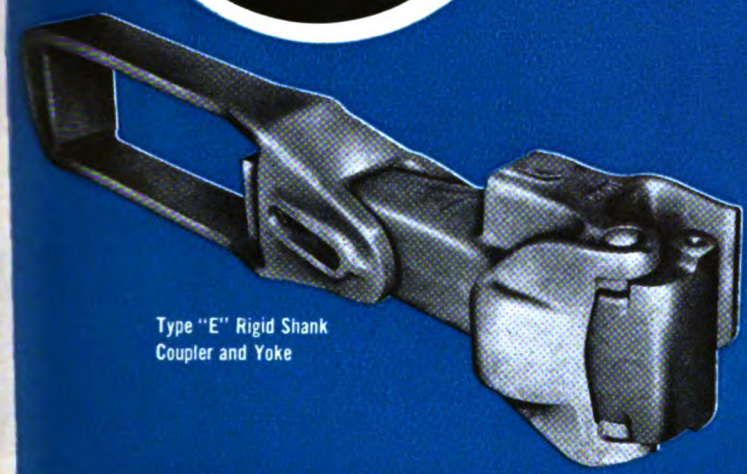


Blower supplies heat for drying traction motors.

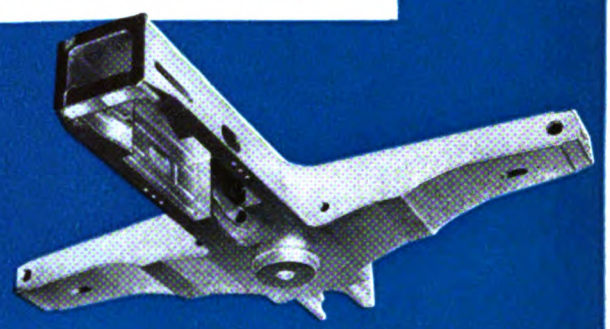


Equipment for load testing is truck mounted.

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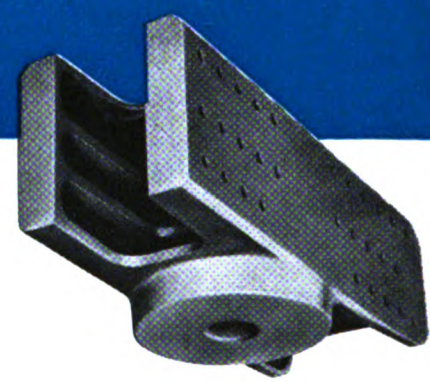


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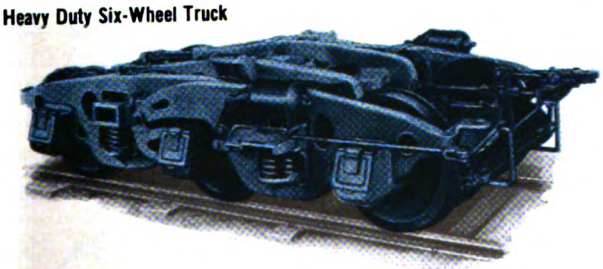


C-R (Cushion-Ride) Truck
with Roller Bearings



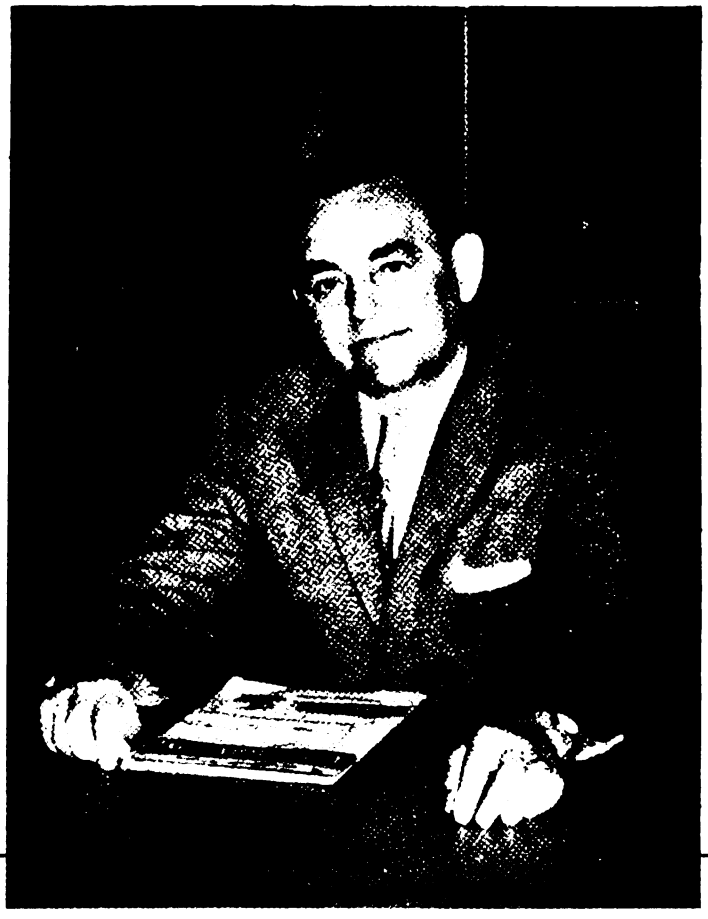
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Heavy Duty Six-Wheel Truck



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(Continued from page 32)

hauled at 400,000-mile intervals; road freight units at 350,000-mile intervals, and switchers at 250,000-mile intervals.

Nine tracks are available for all classes of repair. Three tracks lead into the shop from the north end at pits 6, 14, and 20. Track 14 is a new through track designed to eliminate any bottlenecks which could develop if the other two tracks are in use.

Diesel units either for Class 2 or 3 repairs generally enter the shop on Track 6. In Class 3 repairs, the carbody is lifted off the trucks and placed on the adjacent pit. After the engine is removed, the carbody is washed with hot water and steam. The carbody is then moved to any of the pits west of Track 6. The diesel engine is placed at the stripping area where it is disassembled, and the crankcase parts are cleaned prior to delivery to the rebuild areas.

In Class 2 repairs, the unit is placed on Tracks 7, 8, or 9. The hood or roof is lifted off to simplify removal of power assemblies. The carbody interior, engine, and accessories are wiped free of dirt and grease. Overhauled power assemblies are installed. Trucks are inspected and repaired, wheels are turned, and traction motors examined.

A 160-ton overhead traveling crane serves the entire length of the shop; a 10-ton crane covers the work tracks and cleaning area; a 20-ton crane serves the truck repair and wheel repair area, and a 10-ton crane services the entire electrical shop.

Cleaning Facilities

All facilities for the cleaning of carbodies, engines, and component parts are in the southeast corner of the shop, an important factor in minimizing dirt and grease in the locomotive rebuild and component rebuild areas. The diesel component rebuild area is partly mechanized. Cylinder heads, mounted on special stands, are overhauled along a roller conveyor line.

Piston and liner assemblies from the enginehouse and shop are stripped at pit 3. The pistons, liners, heads, and valves go to the cleaning vat and are then washed with hot water and steam. Valves, connecting rods, pins, and carriers are put through to the degreaser. Valves are cleaned with abrasive and go to a Zyglo unit for inspection before being ground on a Black & Decker grinder. Rods, carriers and pins from the degreaser are inspected in the Magnaglo cabinet. Heads and pistons, after washing, are cleaned in an abrasive cleaning machine and are then tested for defects with Magnaglo. After testing, all parts are moved to the component rebuild area and checked for tolerance. Power assemblies are then built up and racked in sets of four.

The electrical department has equipment for overhauling traction motors and generators. Rewinding and heavy work on field coils are done by outside contractors.

New equipment in the shop includes a Bear dynamic balancing machine, a Peerless armature commutator undercutter, a Peerless commutator turning and banding machine, a Vapor degreaser, and a heavy duty baking oven. Fabrication and repair of parts, such as pilots, steps, and traction motor gear cases, is done in the forge shop adjacent to the main shop building.



Seven-track enginehouse section is in near end of GTW shop building at Battle Creek. The building, built in 1907, covers over 100,000 sq. ft, providing adequate space both for running and heavy repairs. GTW was one of last U.S. lines with a sizeable steam locomotive fleet. End of steam operation permitted full conversion of shop facilities.

Shopping Schedule for Classified Repairs

	Mileage between class repairs	Sequence of class repairs	Mileage for complete sequence (000)	Estimated time for complete sequence (Years)
PASSENGER:				
EMD GP9 and GP18	400,000	2-3-2-3-2-4	2,400	12
FREIGHT AND ROAD SWITCHER:				
EMD GP9	400,000	2-3-2-3-2-4	2,400	18
EMD F3	350,000	2-3-2-3-2-4	2,100	15
EMD 1,200 hp	250,000	2-3-2-4	1,000	15
SWITCHER:				
EMD 900 and 1,000 hp	250,000	2-3-2-4	1,000	20
Alco 1,000 hp	250,000	2-3-2-4	1,000	20

Classified Repairs

ALCO LOCOMOTIVES	EMD LOCOMOTIVES
Class 2 Repairs—Power Assembly Overhauls	
1. Install reconditioned cylinder heads, pistons, rings, pins, liners, connecting rods, rod bearings, and renew related seals.	1. Install reconditioned cylinder heads, pistons, rings, carriers, liners, connecting rods and rod bearings, and renew related seals.
2. Recondition injectors and pumps.	2. Recondition injectors.
3. Clean oil separators.	3. Clean oil separator.
4. Recondition exhaust manifold and renew gaskets.	4. Recondition exhaust manifold and renew gaskets.
5. Renew main babbitt type bearings.	5. ———
Class 3 Repairs—Engine Rebuild	
(Includes all Class 2 items plus the following)	
10. Remove cam shaft, gear train, and renew or recondition parts.	10. Remove crankshafts, gear trains, accessory gear train, and replace or recondition parts.
11. Check crankshaft alignment, inspect and Magnaflux crankshaft journals.	11. Check crankshaft alignment, inspect and Magnaflux crankshaft journals.
12. Check alignment of crankshaft bores.	12. Check alignment of crankshaft bores.
13. Recondition overspeed trip mechanism and injector linkage.	13. Recondition overspeed trip mechanism and injector linkage.
14. ———	14. Recondition harmonic balancer.
15. Remove and anneal all copper piping.	15. Remove and anneal all copper piping.
16. Replace all engine seals and gaskets.	16. Replace all engine seals and gaskets.

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Last Word on Diesel Maintenance

By Gordon Taylor

One day a visitor at Centerville diesel shop asked the electrical foreman, Doc Watts, how the effectiveness of a preventive maintenance program could be determined.

"That," replied Doc, "is easy to answer. It is determined by no one with an official title; it's the diesel locomotive, itself, that has the last word on that matter. Too many people fail to realize this. You can't cheat a diesel locomotive because it will eventually tell on you with a delay or failure. The diesel is not a 'yes man.'

"I learned that early," Doc continued, "when I went up to a builder's plant at the time diesels were just getting a good start on railroads. While there, I heard a discussion on the merits of various brands of diesel engine lubricating oil. One railroader said he liked brand A, while another said he liked brand B. At this point, one of the builder's men spoke up: 'We're not trying to learn which brand you gentlemen like,' he said, 'we want to know which brand the diesel likes.'

"I've never forgotten that incident and ever since then I have let the performance of the diesel point the way to changes needed in our preventive maintenance program. Much can also be determined by careful inspections."

"Thanks for that explanation," said Doc's visitor, a supervisor from another railroad. "What have careless inspections led to on this railroad?"

"I'll give you an example," replied Doc. The case illustrates how careless inspection of jumper control cables and their receptacles can cause serious delays. Many maintainers are fully aware of the troubles caused by faulty control cables, but too few maintainers check receptacles closely when they connect the jumper cables.

"A two-unit E7 passenger locomotive left this terminal and operated perfectly for the first 100 miles to the next division point. Shortly after leaving there, the wheel-slip relay operated and the locomotive lost power, although the engines continued to run. This caused the engineman to check fuses, and he quickly found the 30-amp control fuse in the lead unit was blown. This control fuse was replaced several times, but would open each time the locomotive started.

"The crew radioed the division point and an electrician drove to the locomotive with more fuses. He pulled all the smaller fuses, tested them, and started to replace them. When he installed the fuse for the Mars headlight, the 30-amp control fuse blew again. He removed the headlight fuse, although subsequent events showed it really had no part in the trouble. After applying a new 30-amp control fuse, he sent the locomotive on its way with the headlight inoperative. An electrician at the next division point was told to meet the locomotive with a supply of fuses and was informed as to the reason for the inoperative Mars light.

"In the meantime, the locomotive experienced more trouble. By applying new fuses, the engineman managed to 'worry' his way to the next division point. The electrician supplied extra fuses, but could find nothing wrong with the oscillating headlight. He also tested control circuits, but could find nothing wrong.

"When the locomotive started to move out of the station with its train, it was in trouble again before it had gone a hundred feet—wheel slip relay action and a blown 30-amp control fuse. An intensive inspection was made. When the jumper cable connecting the two units was disconnected, some bent contact pins were found in the receptacle at the rear of the lead unit. A portion of the pin connecting with wire WS-10 was bent at right angles so it touched other contact pins when the locomotive's vibration moved it. While there were two other pins which did not align perfectly with the jumper cable plug, they were not in a position to cause trouble.

"The pins were straightened as much as possible and the jumper was again installed. It was then found that the wheel slip continued to burn. Interlock contacts of the wheel slip relay on the rear unit had been welded together. When these wheel-slip contacts were opened, the wheel slip light went out. The locomotive then completed its run without further trouble.

"When the locomotive got back to Centerville, the wheel-slip relays on the rear unit were repaired and contact pins replaced in the receptacle on the rear of the lead unit."

"What did the Mars headlight have to do with the control fuse?" Doc's visitor asked.

"That's just what I was coming to," replied Doc. "When the receptacle was repaired, it was discovered that a portion of the split pin WS-10 in the receptacle had bent to a position where at times it would touch pin N-4. Pin N-4 was badly burned where WS-10 had touched it.

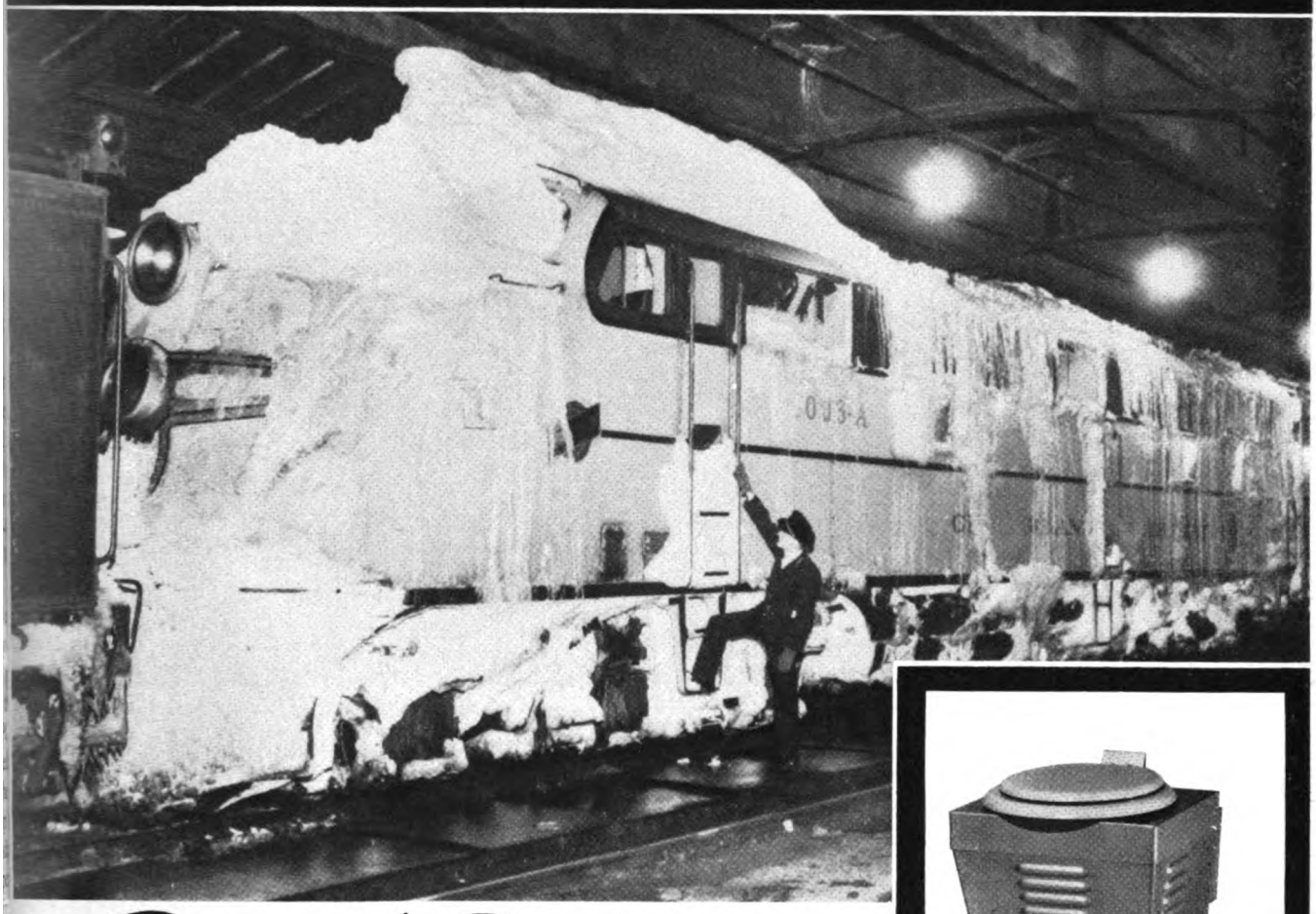
"If you trace the control circuit starting with the 30-amp fuse, you will find that control current passes through the control switch to the PC wire. A branch tap from the PC wire connects to one side of wheel-slip relay interlock contacts for the purpose of lighting the wheel-slip light. When this locomotive got on slippery rail and the wheel-slip relay operated, it served to connect the PC wire with the WS-10 wire. When the wheel-slip action occurred, it connected the 30-amp control fuse directly to the N-4 wire, to a negative ground.

"It developed that the Mars headlight really had no part at all, except that it diverted the electrician's attention so that the real cause of the trouble was not immediately found. The headlight fuse feeds off the lighting circuit and is not connected to, nor does it provide a feed to the 30-amp control fuse.

"The lesson to be learned from this particular case is that defective jumper control cables and their coupler plugs and receptacles are trouble makers on diesel units. Use a flashlight to examine contact pins in jumper cable receptacles and know that they are in good condition when applying the cables. Use great care to line up the jumper plug with its key slot in the receptacle before attempting to push it into the receptacle. Give the N-4 contact pin special attention when inspecting the control cable receptacle.

"As for your preventive maintenance program, it's only successful when it pleases and protects the diesel. Remember, it has the last word.

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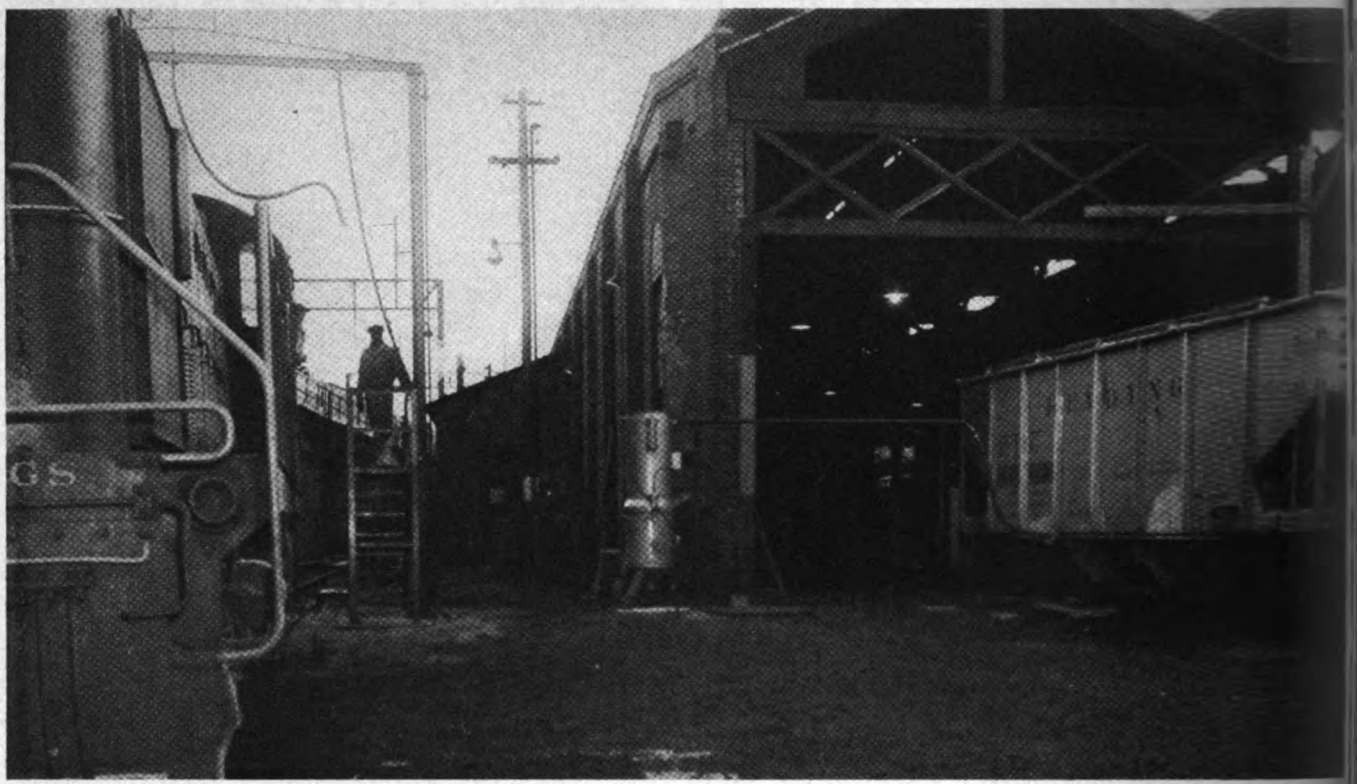
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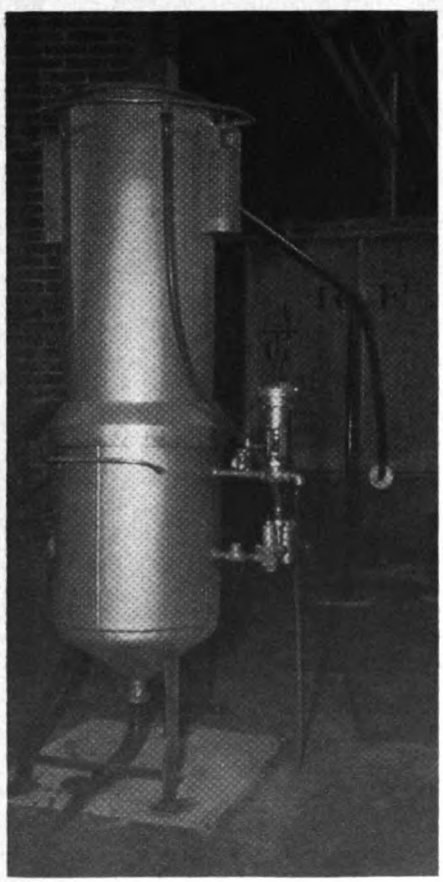
RESEARCH PRODUCTS MANUFACTURING COMPANY

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Sanding arrangement at Philadelphia locomotive terminal now is centered around the Impco unit and storage in covered hopper car.

New Sanding System for Reading



Upper chamber in two-section Impco unit serves to store sand for bottom chamber from which sand goes into the dispensing hoses.

The Reading is going out of the sand drying business. The equipment which is making this possible is also changing the sand storage and handling procedures at the railroad's locomotive terminals. It was estimated that there would be savings of $150,000 annually when the changeover was completed at seven terminals last year.

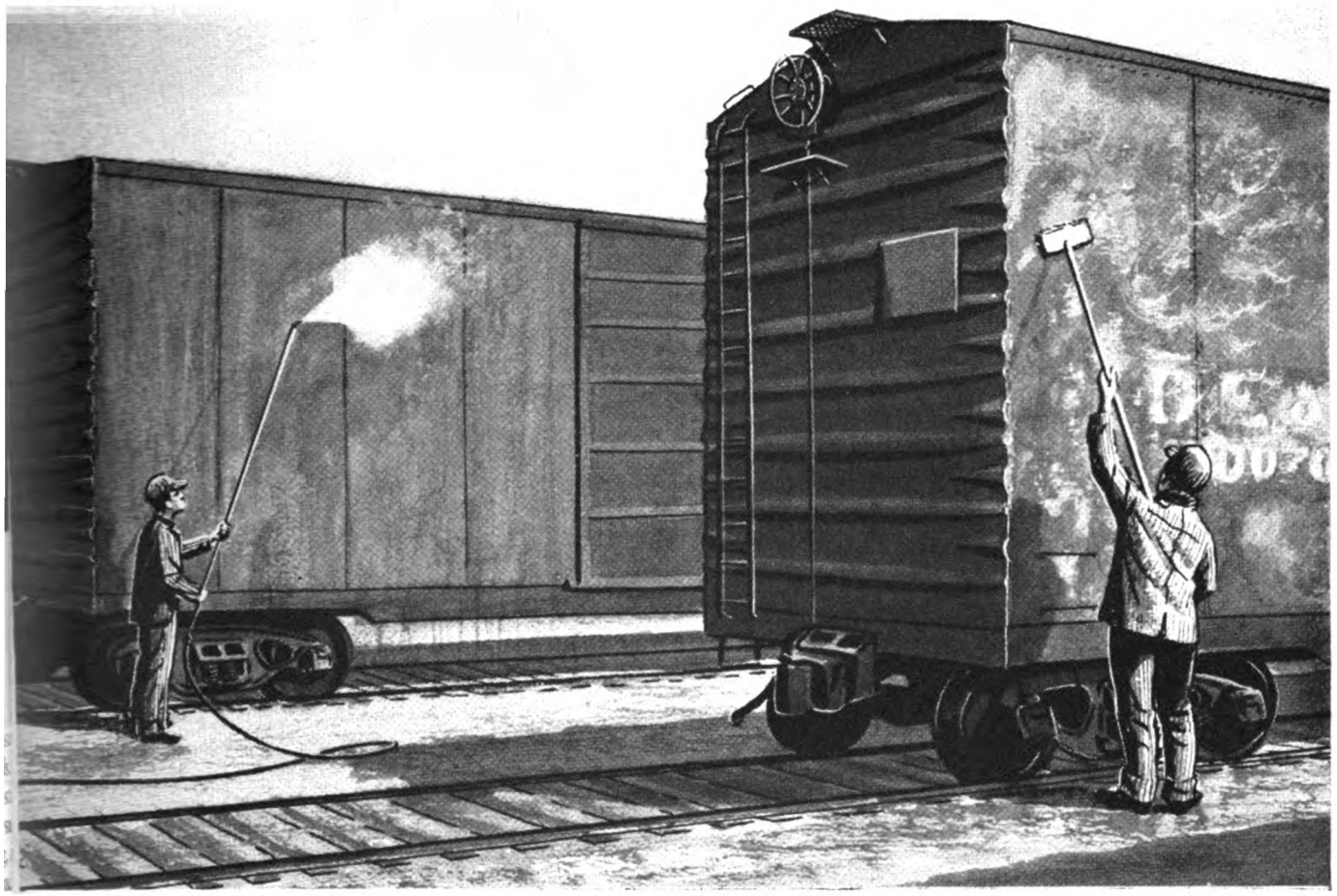
The device which is making this possible is the Impco Sandflow unit, a compressed-air actuated transfer system which makes it possible to move dry sand directly from the covered hopper cars in which it is shipped to the sand dispensing hoses. It consists of two chambers, one above the other. The supply top chamber draws dry sand from the car or ground level and holds it in reserve until called for by the bottom chamber. The dispensing bottom chamber transfers dry sand from the unit to the locomotive sandbox, or to an overhead tower. In operation, these two chambers operate simultaneously, the top chamber drawing sand to the unit and the bottom chamber dispensing sand from the unit.

Adoption of this equipment followed investigations made by the Reading mechanical department when it became necessary to replace sanding facilities at several terminals. It was during the course of this study that it was decided to stop drying sand. Average cost of handling, drying, and storing a ton of sand on the Reading was $10.50 per ton. At some terminals the cost was considerably higher. It was found that dry sand could be purchased for under $3 per ton. The road uses over 16,000 tons of sand annually. With an economical method for transferring this sand from cars to locomotive sandboxes, large savings would be possible.

The Impco unit was found to be applicable to different facilities existing on the Reading. While its basic design eliminates need for overhead sand storage towers, the unit can be used in conjunction with them, or with a ground-level storage facility.

The storage which the Reading is using at the terminals where the system is now used is the covered hopper car in which the dry sand is shipped. The road has rebuilt and assigned ten covered hoppers to sand service. A 7- x 19-in. suction box, welded on the outside of each hopper chute, is fitted with a 3-in. pipe cap. A Vac-u-max suction wand, with hose extending to

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the Impco unit, is placed in this opening when a sand car is spotted at a locomotive terminal.

How Unit Operates

The Impco unit operates entirely on compressed air. The supply chamber is powered by a powerful venturi-produced vacuum of up to 16 in. mercury. The lower chamber dispenses a solid column of sand, utilizing relatively low pressure compressed air. There is only one moving part—a sealing valve between the two chambers.

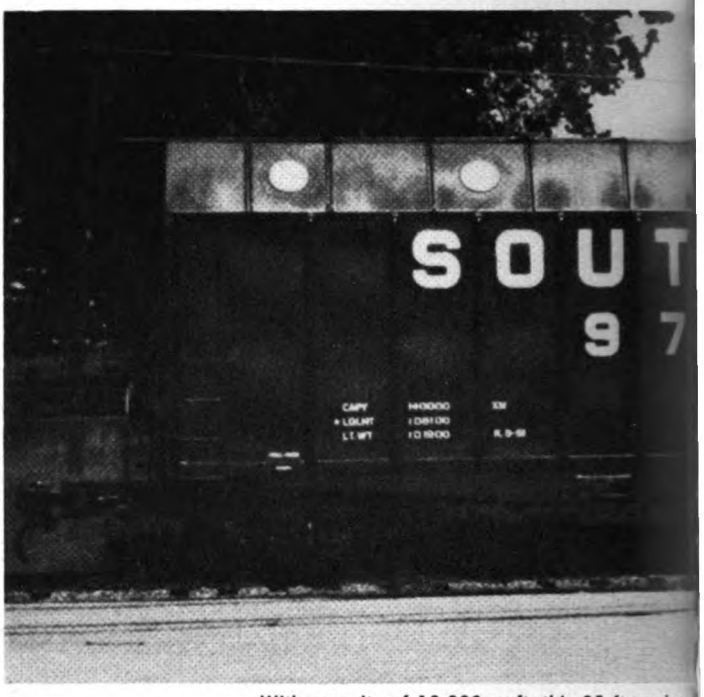
A series of pneumatic valves operate both chambers. These controls are activated by a deadman control pilot valve at the sanding nozzle. Pressure on this control activates the equipment, starting the sand flow; releasing it stops the unit and depressurizes the dispensing chamber.

The arrangement provides for its own replacement as sand is being used. The actual dispensing chamber has to hold only sufficient sand to fill one locomotive sandbox without interruption. During the period the operator moves from one box to the next, the dispensing chamber replenishes itself from the supply chamber and is ready for the next filling operation.

Impco, manufactured by Imagineered Products Co., was developed in close cooperation with Reading mechanical engineers. Conditions were thoroughly studied for passenger, freight, and switching locomotive sanding. High demand periods were carefully checked to ascertain if the basic Impco unit could do the job.

At present, seven terminals are equipped with the basic unit which transfers sand directly from cars to locomotive sandboxes. Eventually all other locations will be equipped with a modified version which will unload dry sand from a car but still utilize present sanding towers.

Generally, a single Impco suffices for most sanding installations whether it be a single drop or multi-drop system. However, in the case of multi-drop systems, if two or more drops are to be operated at the same time, then two or more Impco units will be required. The adoption of the Impco Sandflow system, which enables the Reading to utilize purchased dry sand in bulk, will produce well over $150,000 in annual savings when all seventeen locomotive terminals are equipped.



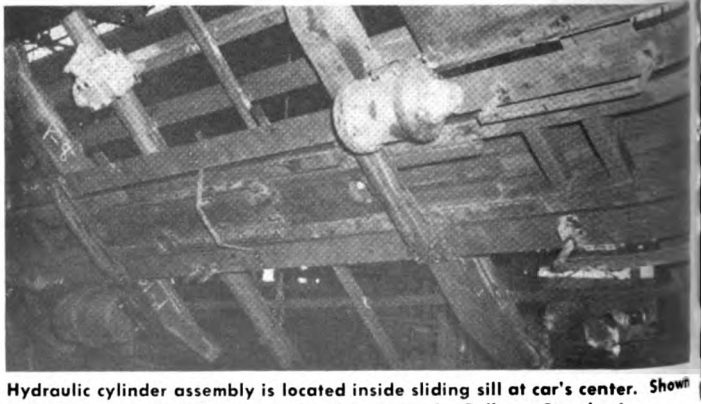
With capacity of 10,000 cu ft, this 85-ft car has

Southern Testin

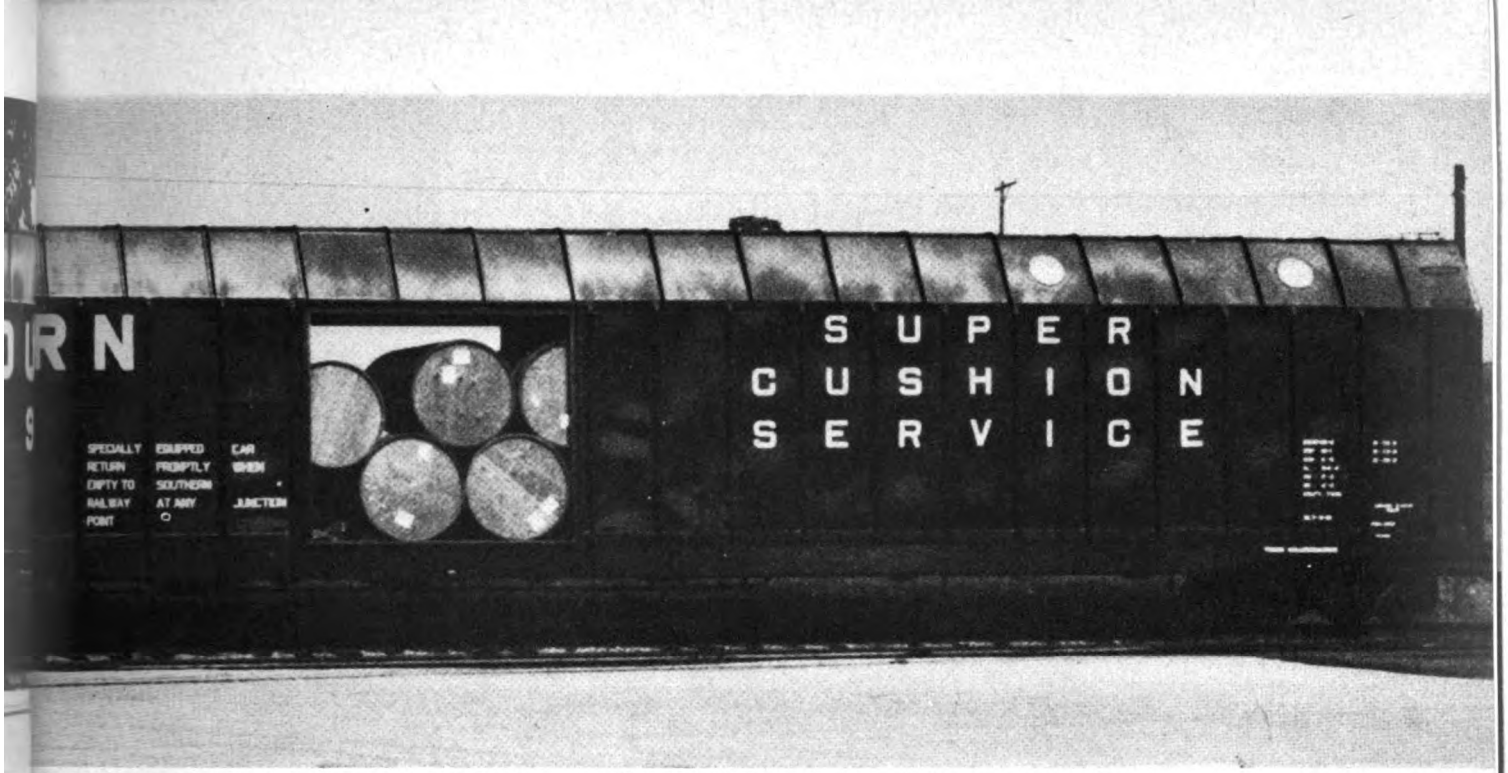
The 85-ft box car which the Southern is now testing is, according to the railroad, "the biggest box car ever built for regular service on any railroad in the world." Previously, the 85-ft length had become a standard for piggyback cars. Tank cars, and gondolas of this length have also been built.

The nominal 70-ton car has a capacity of 10,000 cu ft. Its purpose, the Southern says, is "to get freight traffic back on our rails by offering shippers a car they can use to their advantage while saving money in freight costs." Initially, the car was used for bulk tobacco shipments, but now is reported to be attracting the attention of shippers of many other types of products.

The car was designed by the Southern and was built in its shops. It has an inside length of 84 ft 4 in. and an inside width of 9 ft 6 in. Inside height from the car floor to the top of the door openings is 9 ft. From there, the sloping roof rises to produce a maximum inside height of 11 ft 10 in. Door openings are 10 ft wide so that fork lifts and other materials han-



Hydraulic cylinder assembly is located inside sliding sill at car's center. Shown is underframe on 50-ft car completed last year by Pullman-Standard.



density ladings. It is shown loaded with hogsheads of tobacco. Circular skylights in sloping roof illuminate ends of the car.

...biggest Box Car Ever Built'

dling equipment can maneuver readily during loading and unloading of the car.

The carbody is a single-sheathed steel structure with outside side posts. The design is based on an arrangement incorporated in 200 50-ft box cars built for the Southern in 1960 and 1961 (RL&C, Jan. 1961, p 17). Those cars have pressed hat-section side posts which are welded on the side sheets. Interior sides and ends were then covered with one light coat of primer and six successive roller coats of neoprene rubber paint.

The 85-ft car has 70-ton trucks, a light weight of 101,900 lb, and a load limit of 168,100 lb. Toward each end, in the sloping portions of the roof, are five circular skylights which are designed to provide some natural illumination in the areas remote from the center doorway openings. The car can be loaded with 94 hogsheads of cured leaf tobacco, compared with the 38 hogsheads which fit in a conventional 40-ft car. In recent years, tobacco shippers have been making little use of rail transport. It is this traffic which the Southern hopes to recapture with the 85-ft cars.

The car is equipped with the Pullman-Standard Hydroframe-60 cushion underframe, an arrangement which the Southern designates as "Super Cushion." It consists of a hydraulic cylinder arrangement which is installed inside a sliding sill to give a maximum of 30 in. of travel in each direction. Overall length of the car over strikers, with no underframe compression, is 92 ft 1½ in.

The Southern has also introduced several new types of cars in which high capacity, simplified loading and unloading, or increased lading protection are incorporated. Included are 6,800 cu ft wood-chip gondolas, high-capacity, aluminum-body gondolas, and covered hoppers, and all-door box cars.



Stops in sill contact hydraulic cylinder used in the Hydroframe-60 cushion underframe.



Two hundred of these single-sheathed 50-ft cars went into service in 1960 and 1961. Southern has since ordered 200 "all-door" 50-ft cars (RL&C, Sept. 1961, p 65).

Report

(Continued from page 7)

Garin and Tack Elected Fellows, ASME

P. V. Garin, manager mechanical engineering and research, Southern Pacific, and Carl E. Tack, vice president—engineering, American Steel Foundries' Transportation Equipment Division, were elected to the honorary grade of Fellow by the American Society of Mechanical Engineers at the society's Winter Annual Meeting.

Dr. Eksergian Dies

DR. RUPEN EKSERGIAN, a member of the Board of Managers of the Franklin Institute, Philadelphia, Pa., died on November 30. Dr. Eksergian served on the engineering staff of the Baldwin Locomotive Works from 1920 to 1929, and later became chief consulting engineer for the Edward G. Budd Manufacturing Co., now the Budd Co.

Personal Mention

Baltimore & Ohio.—W. GIBSON appointed superintendent motive power, Western Region. *Baltimore, Md.:* W. C. REISTER appointed assistant superintendent, car department, succeeding Mr. Gibson. C. C. SHELLEMAN, air brake supervisor, appointed supervisor air brakes. W. S. FURLOW appointed regional master car builder. J. M. RYAN, methods engineer, appointed supervisor mechanical methods. *Cumberland, Md.:* B. J. BORGMAN appointed general car foreman, succeeding Mr. Furlow. Mr. Borgman formerly general car foreman at Washington, D.C. *Pittsburgh, Pa.:* A. F. PUGH appointed regional master car builder. Formerly assistant regional master car builder at Willard, Ohio.

Chesapeake & Ohio.—*Richmond, Va.:* A. M. CHILDERS appointed general car inspector, Richmond and Clifton Forge divisions, succeeding J. H. Stroud, deceased. *Russell, Ky.:* R. G. BIAS appointed general foreman—day, and T. E. CALLAHAN, general foreman—night, Russell car shops. *Ashland, Ky.:* W. S. HAMLIN appointed car lubrication inspector.

Detroit & Toledo Shore Line.—*Toledo, Ohio:* LOU SABO appointed superintendent motive power and equipment, Lang Yard.

Erie-Lackawanna.—*Scanton, Pa.:* L. G. ROBINSON appointed master mechanic, succeeding M. B. O'MEARA, retired. *Youngstown, Ohio:* DAVID M. HUGGINS, assistant master mechanic, appointed master mechanic, succeeding Mr. Robinson. *Port Jervis, N.Y.:* HOWARD B. HART appointed general supervisor of air brakes. *Meadville, Pa.:* ROBERT C. ROSE appointed road foreman of engines. WILLIAM E. FLIGHT appointed road foreman of engines, Allegany-Meadville divisions.

Florida East Coast.—*St. Augustine, Fla.:* L. LEUDERS appointed general superintendent—locomotive department, with jurisdiction over all locomotive inspection, repair and servicing operations. Position of master mechanic at Bowden, Fla., abolished.

Frisco.—*Springfield, Mo.:* T. H. TEMPLE appointed superintendent motive power. J. P. KNOX, superintendent equipment—East, appointed superintendent car department. G. J. COSSATT, superintendent equipment—West, appointed manager planning and scheduling, succeeding Mr. Temple. J. L. RYAN appointed assistant to chief mechanical officer.

Pennsylvania.—*Philadelphia, Pa.:* C. A. BALDWIN appointed assistant road foreman engines. *Lancaster, Pa.:* N. L. BISHOP appointed assistant trainmaster-assistant road foreman engines.

Santa Fe.—*Argentine, Kan.:* L. A. THOMASON appointed assistant supervisor of air brakes. VICTOR BARBER appointed road foreman of engines, succeeding Mr. Thomason.

Southern.—*Greensboro, N.C.:* MURRAY W. LOY appointed road foreman of engines.

Southern Pacific.—*Bakersfield, Calif.:* M. R. GADDIS appointed general foreman. *San Francisco:* C. E. GABLE appointed traveling diesel supervisor, succeeding Mr. Gaddis. *Oakland, Calif.:* R. A. MOORE appointed assistant master mechanic, Western Division. *Bayshore, Calif.:* W. J. PRESHO appointed assistant master mechanic, succeeding Mr. Moore.

Supply Trade Notes

STACKPOLE CARBON CO.—*Harrison C. Stackpole* elected president, succeeding *Harry S. Conrad,* resigned. Mr. Conrad remains as vice-chairman of the board of directors.

■

BUCKEYE IRON & BRASS WORKS.—Agreement entered into with *Enterprise Railway Equipment Co.,* Chicago, whereby Enterprise will serve as U.S. representative for Buckeye's automatic diesel refueling system for railroads.

■

WORTHINGTON CORP., AIR CONDITIONING DIV.—*Fred H. Rahe* appointed representative in charge of sales of refrigeration equipment for truck, railway piggyback, and container operations in Metropolitan Northeast Zone which includes New York, New Jersey, and Connecticut areas.

■

AIR REDUCTION SALES CO.—A DIVISION OF AIR REDUCTION CO.—*J. R. Kirwin* named assistant manager of gas sales, Philadelphia district. Mr. Kirwin formerly assistant manager, Buffalo district.

■

THRALL CAR CO.—*Charles A. Mapp,* assistant vice-president of sales, named vice-president.

■

AMERICAN STEEL FOUNDRIES.—*J. R. Drever* named president of ASF Research Laboratory at Bensenville, Ill. Mr. Drever formerly president of Griffin Wheel Co., Chicago, and Griffin Steel Foundries, Ltd., Canada, ASF subsidiaries. *R. H. Wellington* and *C. F. Strom,* formerly Griffin Wheel vice presidents, elected vice-presidents of ASF.



William G. Miller
Alco



William A. Callison
Alco



Fred H. Rahe
Worthington



Thomas J. Maher
Eutectic



Harrison C. Stackpole
Stackpole Carbon

■

VASCOLOY-RAMET CORP. — *Carrier Supply Co.,* 818 Olive st., St. Louis, Mo., appointed sales agent for V-R carbide cutting tool products for railroad use.

■

HUCK MANUFACTURING CO.—*Louis Colosimo* appointed eastern regional tool sales and service representative, with headquarters in Newark, N. J. *Lee T. Pedley* appointed sales representative, Pittsburgh, Pa., area.

■

EUTECTIC WELDING ALLOYS CORP.—*Thomas J. Maher* appointed manager, Railroad Industry Sales.

■

A. M. BYERS CO.—*A. S. Chalfant,* vice president — sales, elected president, succeeding *Buckley M. Byers,* resigned.

■

PESCO, INC.—Pesco has purchased from the *Harnischfeger Corp.* exclusive manufacturing and sales rights on P&H Welding positioners in continental U.S.A. Positioners will continue to be sold through Harnischfeger's Welding Products Division as well as through Pesco sales outlets.

ALCO PRODUCTS, INC.—*William G. Miller* elected president, succeeding *William S. Morris*, retired. *William F. Lewis*, president of Montreal Locomotive Works, elected a director. *Perry T. Egbert* continues as chairman of the Board. *William A. Callison* elected senior vice-president, Western region, with headquarters in Chicago. Mr. Callison previously vice president—transportation product sales, Western region.

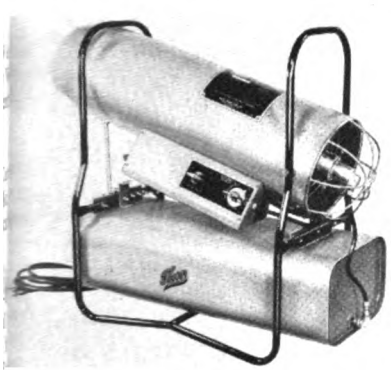
Mr. Miller, a graduate from Stevens Institute of Technology (1927), became associated with Alco in 1932 as a project engineer. From 1937 to 1939 he was in charge of Alco oil refinery construction in France, and during World War II served on the staff of Alco's manufacturing vice-president. Subsequently he was superintendent of diesel locomotive division at Schenectady, N.Y.; manager of Auburn, N.Y., plant; executive assistant to board chairman; executive vice-president and president, Montreal Locomotive Works, and vice-president in charge of Alco thermal and petroleum industry equipment groups. He was named executive vice-president of Alco in June 1961.

■

ABISOL PRODUCTS CO.—*Abisol Products* of West Haven, Conn., acquired by *Sterling E. Killebrew* from company's founder, *Frank Wall*. Mr. Killebrew formerly manager of railway division, Oakite Products, Inc. Abisol manufactures industrial detergents, specializing in transportation field.

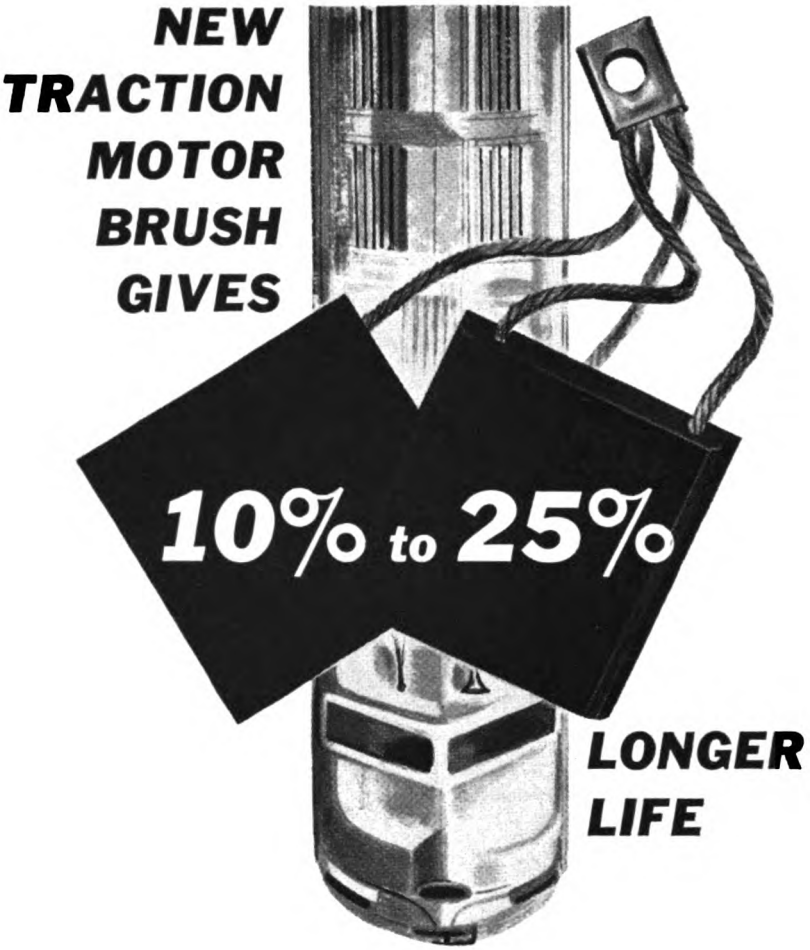
What's New

(Continued from page 15)



Portable Space Heater

Low pressure firing, using .90 gal fuel per hour, permits the Thor portable space heater to operate 13 hr continuously at low fire. The burner atomizes fuel centrifugally, and there are no nozzles, burner tips, or small orifices to become clogged. The heater, without fuel, weighs 42 lb. It can be operated wherever standard electric voltage exists. By turning the dial from low to high, temperatures are controlled by an output of 70,000 to 125,000 Btu per hour. *Thor Power Tool Co., Dept. RLC, Aurora, Ill.*



. . . regardless of operating duty

It's one thing when a new brush grade shows significantly longer life and improved commutation for one type of service.

It's remarkable when this same brush outperforms other brushes in *every* type of service!

But Stackpole Grade AC-35 traction motor brushes do just that. They have been tested on locomotives throughout the country for over two years—in freight and passenger duty, long and short hauls, mountainous and flat terrains.

Throughout the tests improvements in brush life using AC-35 averaged 10% to 25% above even the best "restricted duty" brushes previously used . . . and with equally gratifying reductions in commutator maintenance.

Based on brush costs-per-mile, commutator reconditioning costs, and possible elimination of duty restrictions, Stackpole Grade AC-35 offers a significant opportunity to keep diesel-electrics running . . .



profitably.

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diesel-electric **BRUSHES**

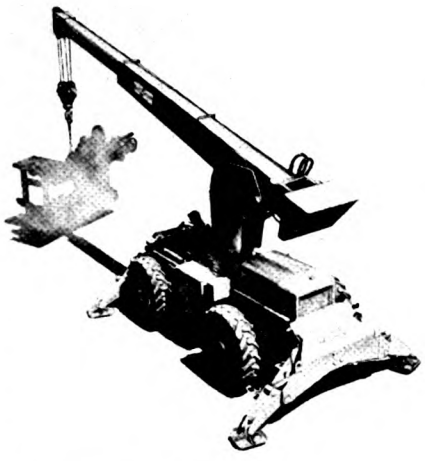
STACKPOLE CARBON CO. St. Marys, Penna.

Degreaser Compound

F.O.-300 is a heavy-duty, multi-purpose degreaser liquid concentrate that can be rinsed or flushed, it is said, with water without leaving streaks or stains. It is practically odorless, non-toxic, and can be used on all metals and painted surfaces—as a spray in petroleum mix or water mix; as a steam cleaning compound, or as a pressure spray. According to the manufacturer, the concentrate for more than a year has been tested and found successful in cleaning walls and floors of diesel locomotives, in cleaning trucks and underframes of passenger cars, in removing oil and grease from head end cars before regular washing, and in diesel vat and back shop cleaning where there are no heating facilities. *Fine Organics, Inc., Dept. RLC, Lodi, N. J.*

CAR SHOP FOREMAN

Chicago-based railroad seeking man with strong background in heavy freight car repairs. Thorough knowledge of construction methods and AAR rules necessary. High school graduate. Some engineering background preferred. Age to 40. Excellent salary and fringe benefits. Outstanding opportunity for growth. Submit resume and present salary to Box 162, Railway Locomotives and Cars, 79 West Monroe Street, Chicago 3, Illinois.



All-Hydraulic Crane

The 360-deg rotating, telescoping boom of Pettibone 25 Multikrane can be hydraulically extended from 15 to 25 ft. Its full 25,000-lb capacity is maintained at a 10-ft radius, or can be increased out to 14 ft directly over the front. The crane features a fast 200 fpm line speed with a single-part line, and 50 fpm with a four-part line. A hydraulic transmission with a special shuttle gear provides smooth handling through eight full speeds forward and eight full speeds in reverse. A Hercules G-339H gasoline engine is standard equipment. Outriggers at all four corners can be operated individually. *Pettibone Mulliken Corp., Dept. RLC, 4700 W. Division st., Chicago.*

Trade Publications

PRODUCTIVE MAINTENANCE SERVICES. 8-page bulletin, GEA-7091, discusses facilities and capabilities of G-E apparatus service shops. (Write: *General Electric Co.*, Dept. RLC, Schenectady, N. Y.)

SCREWS AND BOLTS.—Two-color folder, "Imagineering," illustrates line of screws, bolts, washers and rivets produced to meet regular industry demands. (Write: *Screw & Bolt Corp. of America*, Dept. RLC, P.O. Box 1708, Pittsburgh 30, Pa.)

MOTOR AND GENERATOR WELDING.—Two-page bulletin, GEA-7568, describes how Tungsten inert gas arc welding is used during service shop rebuilding of d-c motors and generators. (Write: *General Electric Co.*, Dept. RLC, Schenectady N. Y.)

SOLID LUBRICATION. 8-page Bulletin 132, "Breaking Lubrication Barriers," discusses theory and use of solid lubricants. (Write: *Alpha-Molykote Corp.*, Dept. RLC, 65 Harvard ave., Stamford, Conn.)

LOCKBOLTS. 8-page Bulletin T-194 includes information on standard lockbolts, how they work, application procedures, how to order, and installation practices. (Write: *Townsend Co., Engineered Fasteners Div.*, Dept. RLC, Box 71-Z, Ellwood City Pa., or *Cherry Rivet Div.*, Dept. RLC, Box 2157-Z, Santa Ana, Calif.)

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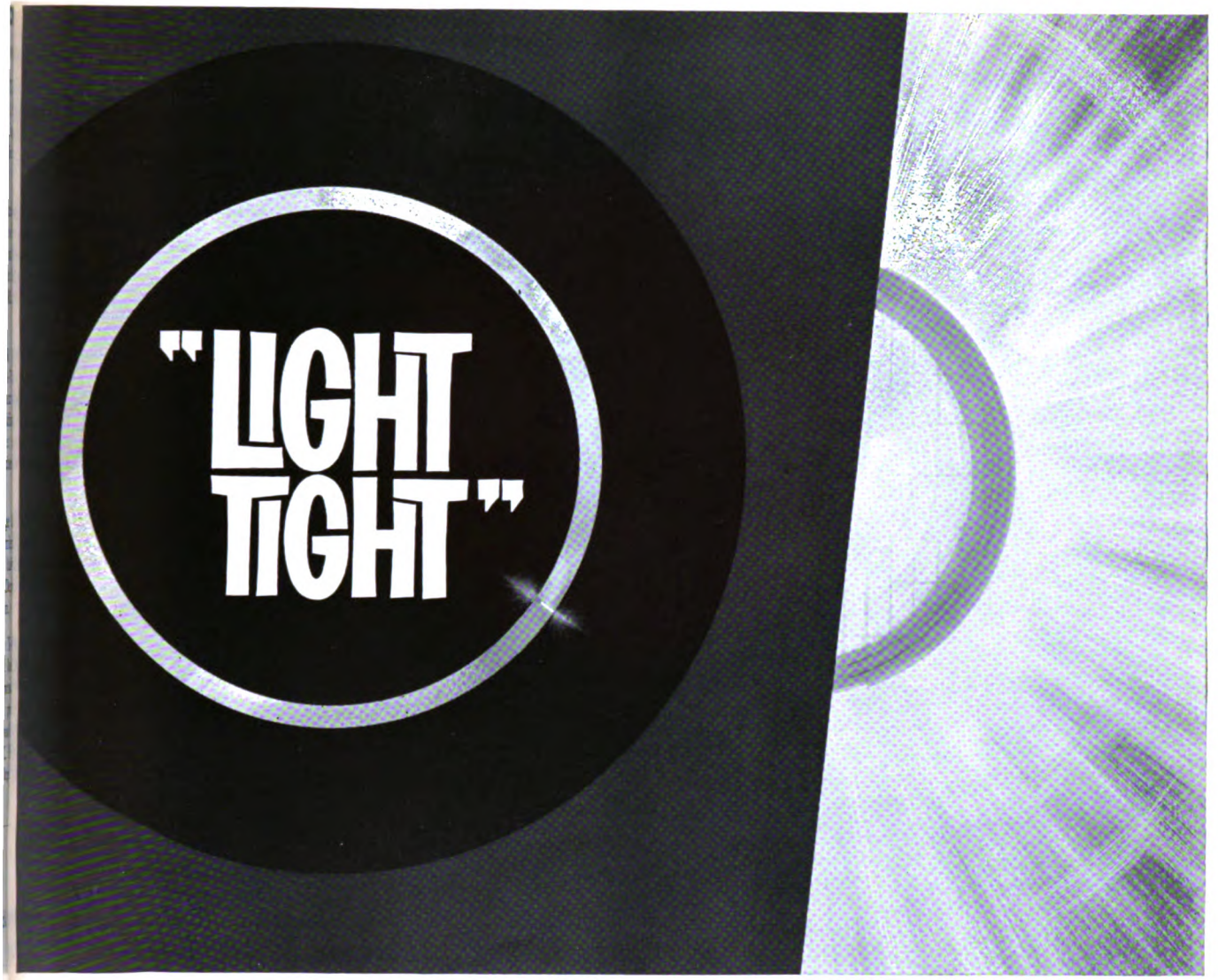
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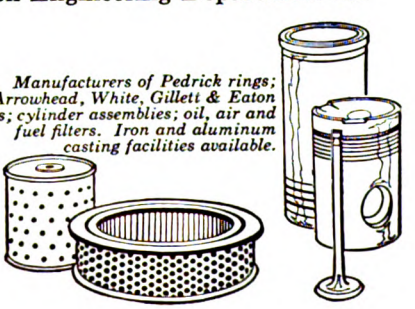
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To assure a positive seal between piston and cylinder wall, Pedrick compression rings are "light-tested". This means each ring is placed in a gauge of cylinder size and backed with an intense light. If no light leaks past the face of the ring and cylinder—except at the gap—it has been properly designed and produced.

Light-testing is only one example of how quality is built into Pedrick rings.

Others include: individual castings which give higher uniformity and tensile strength . . . Pedrick originated "double-disk" grinding where both sides of the ring are ground simultaneously to perfect flatness . . . scuff resistant surface treatment . . . chrome facing where required.

Pedrick rings—positive power for any engine and any type of service. If you have a ring application problem, need a special ring or a Precisioneered® set, write the Pedrick Engineering Department for prompt attention.



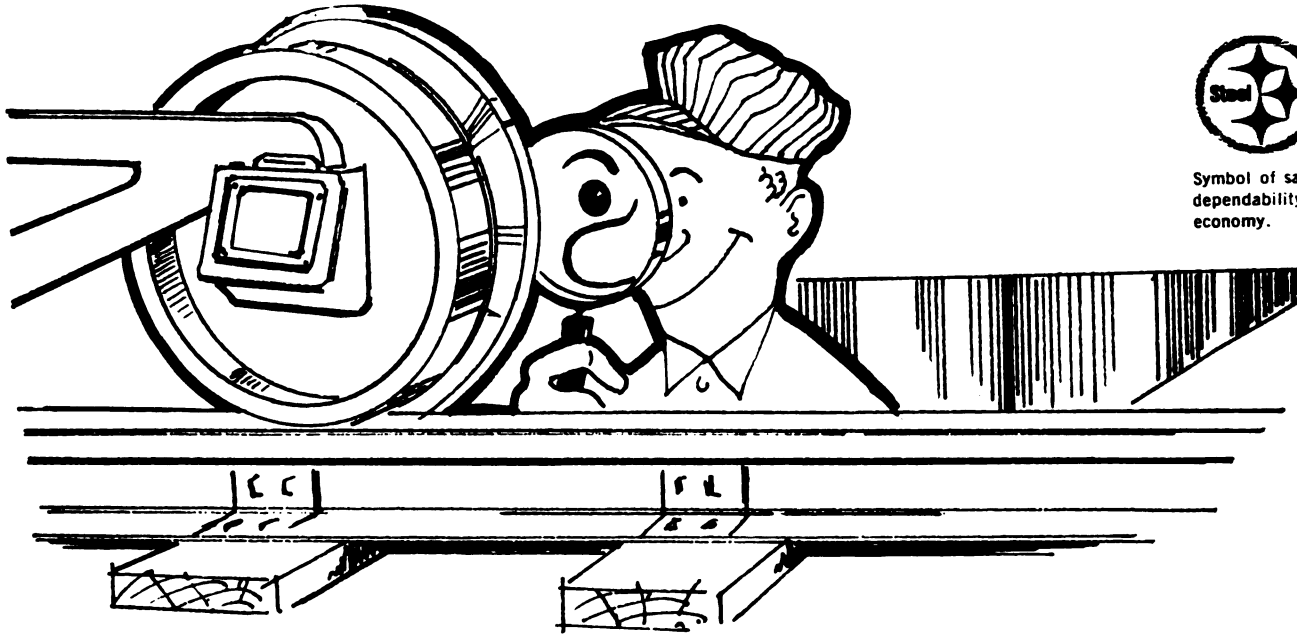
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Forging and rolling make a big difference in one-wear wheels. But don't just take our word for it. See for yourself. *Look under your cars.* Check the dates on the back of the rims of your wrought steel wheels.

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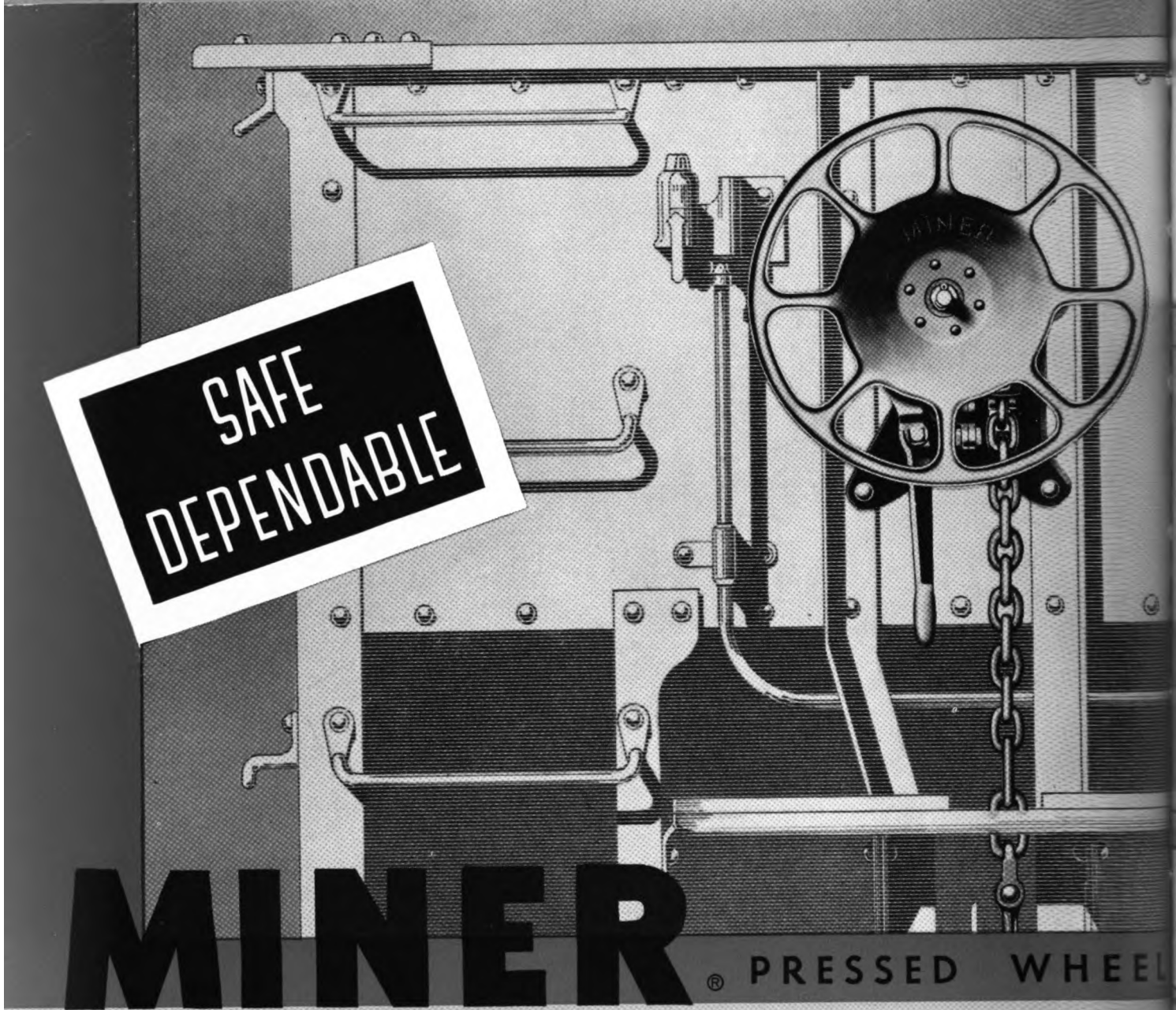
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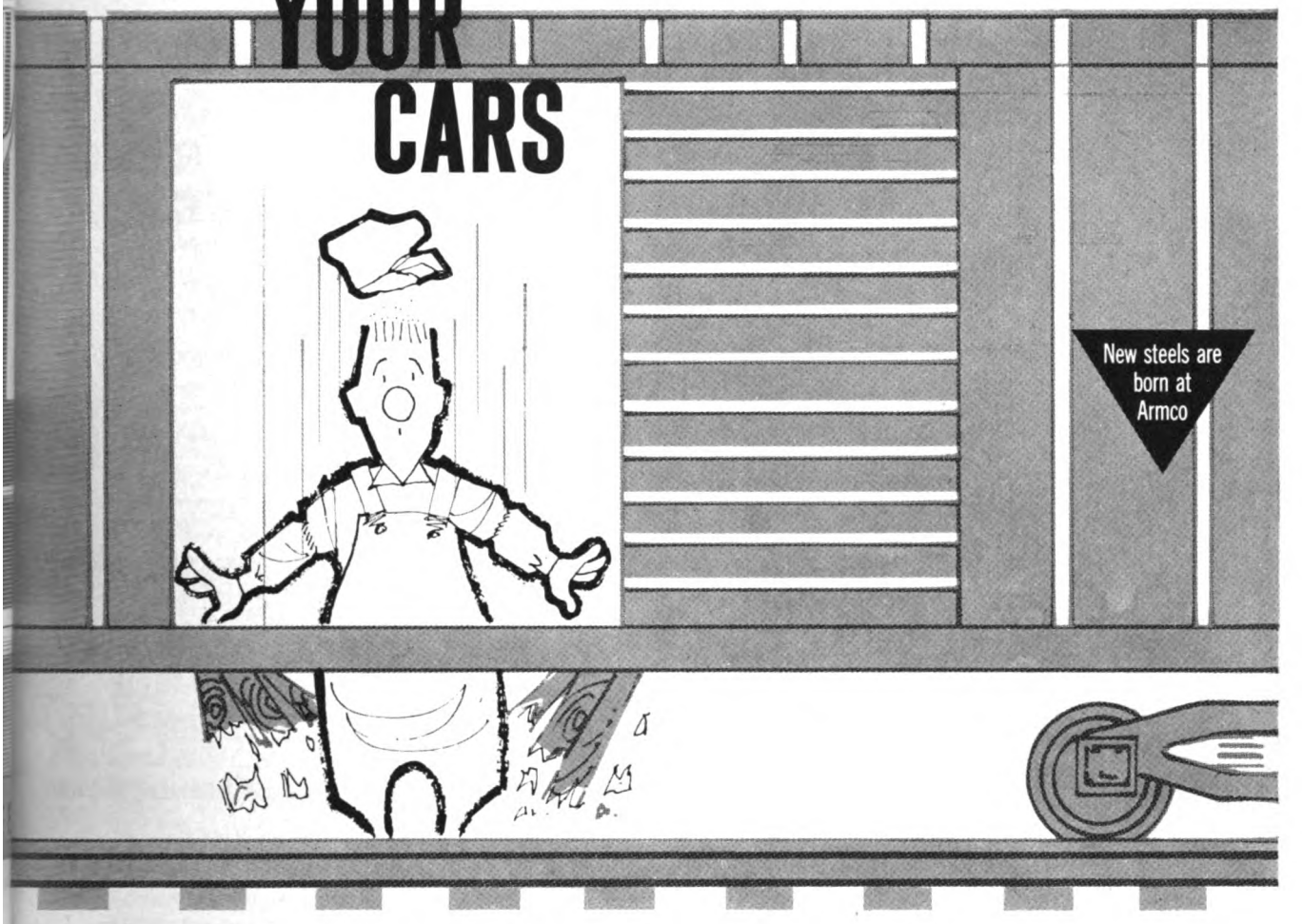
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Armco Floors are combination wood and steel. Stout wood planks are *nailable*. Alternating steel hat-sections provide top beam strength and solid floor surface. Both reinforce car underframes—resist damage to themselves while they protect lading.

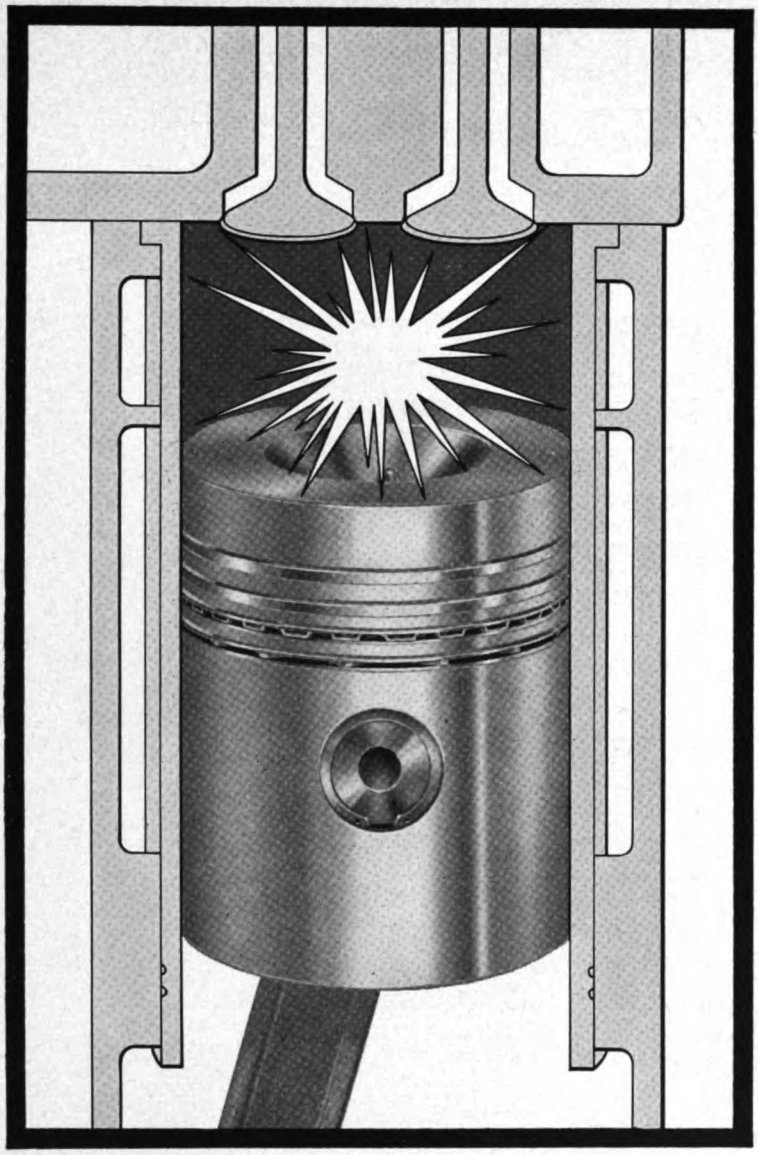
Get complete information on these durable floors that come tailored to your cars. Call your nearest Armco sales office or write **Armco Division, Armco Steel Corporation, 602 Curtis Street, Middletown, Ohio.**

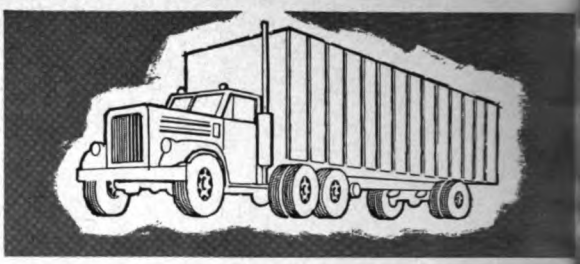
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Symbol of strength, durability, economy

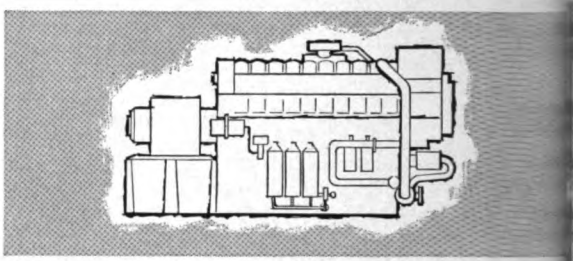
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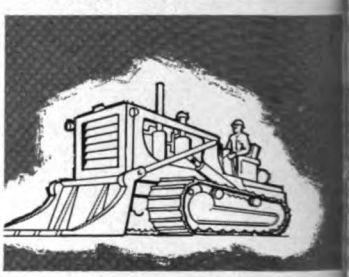




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REPORT FOR FEBRUARY

Plans Completed for RR Conference in April

"Metropolitan Transportation" is the theme of the 1962 Railway Conference to be held at the King Edward-Sheraton Hotel, Toronto, Ont., April 9 and 10. The Engineering Institute of Canada is sharing the sponsorship of the Conference which is a joint activity of the Railroad Division of the American Society of Mechanical Engineers and the Land Transportation Committee of the American Institute of Electrical Engineers. Following the sessions on Monday, April 9, some of the new 75-ft, 64,000-lb aluminum cars for the Toronto Subway System's University Avenue Extension now under construction will be available for inspection during a tour of the subway arranged by the Toronto Transit Commission. The design of the cars is outlined in one of the following technical papers.

MONDAY, APRIL 9

9:30 a.m.

Problems of Selecting a Type of Metro Transportation—W. E. P. Duncan, Toronto Transit Commission.

Rapid Transit Planning—The Backbone of Metropolitan Growth—S. D. Forsythe, National Capital Transportation Agency, Washington, D.C.

Railroad Noise Problems—T. D. Northwood, National Research Council, Ottawa.

2 p.m.

The Evolution of a Modern Transit Vehicle Structure—J. W. Borger, Pullman-Standard Co.

Aluminum Subway Cars for Toronto—I. G. Hendry, Toronto Transit Commission, and D. H. Hellman, Montreal Locomotive Works.

The Use of a Driving Shield for Soft Tunneling in the Toronto Subway—T. M. Noskiewicz, W. S. Atkins and Associates, Toronto.

TUESDAY, APRIL 10

9:30 a.m.

Some Problems Encountered in Design of Automatic Freight Train Controls—R. G. McAndrew, General Railway Signal Co.

Simulation of Train Operations on a Digital Computer—P. B. Wilson, C. J. Hudson, and C. Sankey, Canadian National.

Modern Light Sources for the Railroad Industry—R. D. Churchill and L. L. Henderson, General Electric Co.

2 p.m.

Static Conductor Devices for Railroad Use with Particular Emphasis on Rapid Transit Cars—W. C. Allison, Canadian General Electric Co.

Traction Motor Suspension Design—Carl F. Simon, Jr., General Electric Co.

The Fundamentals of Infrared Hot Box Detection—E. G. Menaker, General Electric Co.

Solid State Rectifiers for M-U Cars—H. S. Ogden and E. F. Weiser, General Electric Co.

AAR Mechanical Division Meets June 26, 27 and 28

The annual meeting of the AAR Mechanical Division will be held in Chicago on June 26, 27 and 28, 1962. Tentative plans were made last year for a three-day session and equipment exhibit to be held earlier in June, coinciding with the meetings of the AAR Purchases and Stores Division. At the time of the announcement, it was indicated that the holding of the simultaneous sessions would be contingent on economic conditions. All plans for a mechanical equipment exhibit have now been cancelled.

The next mechanical exhibit is now scheduled for October 1963 in Chicago. The AAR, the Coordinated Mechanical Associations, and signaling, communications, and maintenance of way groups, along with all railway supply organizations, are to conduct simultaneous meetings and exhibits from October 9 to 16. McCormick Place, the new Chicago convention center, is expected to be used for all exhibits, except cars and locomotives which may be displayed at a nearby yard of the Illinois Central.

(Continued on page 7)

TIME SAVING IDEAS FOR FEBRUARY

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Reducing the Consumption of Traction Gear Lubricants 34
Solid-Bearing Operating Cost Down 36
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Supply Trade Notes 43
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HOW MUCH LADING PROFIT CAN YOU AFFORD TO LOSE ON THE WAY? 8%? 5%? 2½%? Actually, it's the *payload that gets there* which counts. That's why you have to hold down lading losses for maximum hopper car profits.

STOP LADING LOSS

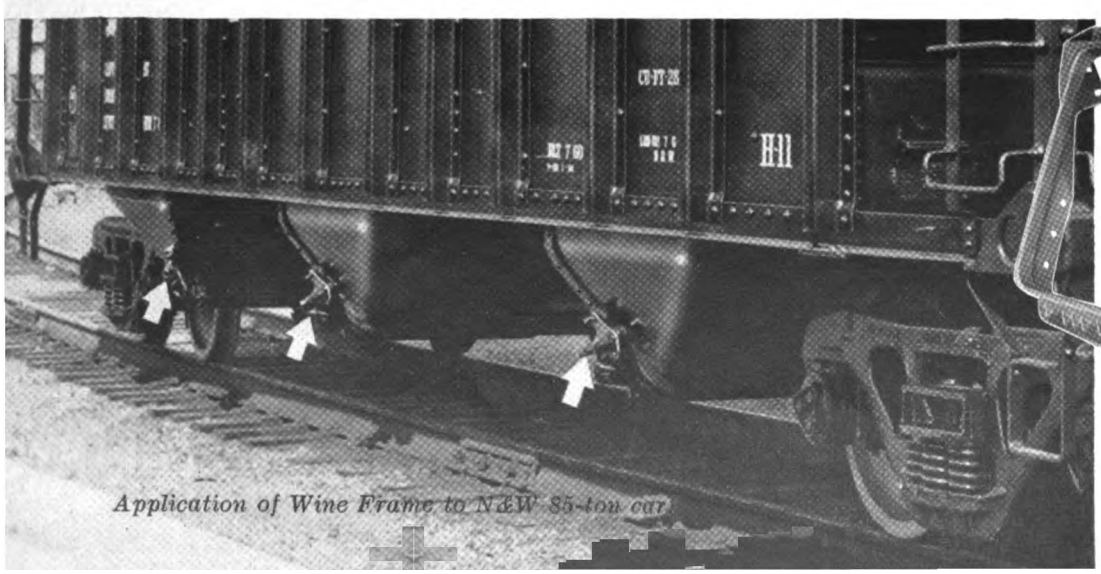
Wine Hopper Frames help stop such loss long after other frames have sagged or corroded. They fit tight. Each unit is a one-piece precision steel casting. Tough, rigid, distortion-free.

Hinge lugs and door lockpads are integral parts of the frame, assuring permanent alignment, bind-free operation and strong resistance against daily abuse of loading impact.

Tied into side or center sills, Wine Hopper Frames add strength to the hopper unit and increase rigidity of the car's entire understructure. Many frame pattern variations available, tapered or flat rim fit, designed to stop lading loss for most type hopper cars.

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Application of Wine Frame to N&W 85-ton car



Your Wine representative will be glad to work with you on Wine Frame applications for your requirements.

In 1961, cooperating fully with AAR olicies aimed at de-emphasis of the formal ieetings of its Divisions, the Mechanical)ivision held a "limited annual business ession," which was open only to committee hairmen and the chief mechanical officer nd one other representative from each ieniber road. Mechanical Division policy ;ill be to hold an open meeting only during lternate years. The 1962 session is ex-ected to be open to railroaders and supply epresentatives.

Modified AB Valve Approved for Test

Application of rubber diaphragms in place of ring fitted piston in service portions of up to 7,500 AB freight car air brake valves for test in interchange has been approved by the AAR Mechanical Division. Roads interested in making tests can get detailed information on modifications to be made from the air brake companies.

Converted service portions are identified by the 1 7/32-in. service body filling piece between the service portion and the pipe bracket. When applied on the standard AB pipe bracket with the standard emergency portion, the valve designation becomes ABC-1. The filling piece and three reach rods which hold the service portion on the pipe bracket studs are part of the converted service portion and remain with it when removed from the pipe bracket. Those failing in service can be replaced with standard AB service portions.

When a converted service portion fails to pass the single car test, the AAR suggests that service representatives of the air brake companies be present, when available, during the rack test and disassembly of failed valves. Failed parts and information as to the cause of failure should be sent to the Mechanical Division.

New Diesel Fuel Standard Proposed

A new primary diesel reference fuel, heptamethylnonane, has been proposed by the National Bureau of Standards as a replacement for 1-methylnaphthalene, the present low-cetane standard used for determining diesel fuels' ignition quality. Investigation of this hydrocarbon was part of a program to improve the quality of primary reference fuels.

Ignition characteristics of diesel fuels are evaluated in terms of the "cetane number" scale. Traditionally, the cetane number is numerically equal to the percentage of n-hexadecane in a blend with 1-methylnaphthalene that gives the same combustion characteristics when measured in a standard engine as the fuel being evaluated. When the cetane scale was developed, the cetane number of n-hexadecane was arbitrarily set at 100 and the cetane number of 1-methylnaphthalene at 0. On the same scale, the highly purified heptamethylnonane has been found to have a cetane number of 15.

Reference hydrocarbons have been used for many years as standards for determining the combustion characteristics of fuels used in engines operating both on spark-ignition and compression-ignition systems. Primary reference standards for the spark-ignited fuels have been available in high purity for 20 years. Although primary standards for the compression-ignition fuels were established about 30 years ago, until recently the low primary standard was not obtainable in high purity. Initially, the demand for diesel fuel was not great and there was, at first, no great need for permanently reproducible reference fuels of high purity. However, production and use of diesel fuels have greatly increased during the past two decades.

When 1-methylnapthalene in 95% purity recently became available in sufficient quantity to be used as a reference fuel, the long-term instability of the cetane vs 1-methylnaphthalene scale became evident. This was primarily due to the failure to achieve reproducible purity of the various lots of 1-methylnaphthalene and to its lack of stability during storage.

To find an improved reference material, the Bureau investigated a number of hydrocarbons and finally selected 2,2,4,4,6,8,8-heptamethylnonane. This material was thought to be the most suitable because it is rather easily synthesized and has been found to be stable in storage. It can also be prepared with reproducible purity.

Insulation Important for Reliable Performance

Improvements in electrical components and the potential for railroad electrification were discussed at the winter meeting of the American Institute of Electrical Engineers in New York on February 1 and 2. The Institute's Land Transportation Committee conducted sessions at which were discussed insulation systems involving epoxy resins and winter's effects on operation of electric equipment.

P. H. Hatch, chief mechanical officer of the Long Island Railroad, and R. P. Turnbull, mechanical engineer, concluded that while "on-time performance during winter has been, and still is, a problem with electric railroad operation, experience acquired over the years, new materials, and advances in equipment design have reduced the problem so electric railroads can rightly lay claim to being the most reliable of all forms of transportation under conditions of snow, sleet, or cold.

Obviously, the severity of a snow storm sets up the initial conditions, but preventive measures taken by a railroad and the basic condition of rolling stock determine the aftermath in terms of equipment failures, out-of-service time, and expense. Locomotives or cars designed for snow conditions and which are well-maintained and have adequate insulation of electrical apparatus have the best chance of coming through a bad snowstorm with a minimum of trouble, Messrs. Hatch and Turnbull reported.

Exposure of apparatus inside a locomotive cab or underneath a multiple-unit car is somewhat easier to combat than is the exposure of traction motors. Low voltage equipment, a-c or d-c, can be protected against snow by suitable housings or cabinets with tight covers. Where such equipment is force-ventilated, it is possible, by suitable design and equipment, to supply clean, dry air with a minimum of entrained snow. Cables and wiring can be located to minimize collection of snow or moisture and can also have additional insulation.

Traction motors, however, are at the heart of the snow problem. This is because they are axle- or truck-mounted, close to the ground, and subjected to maximum exposure to snow. In heavy storms, motors may become pretty well buried in build-up of snow on trucks. In some cases, motor shells have actually acted as scoops to get snow into their interiors. In cases of dry snow, trains may operate for several days after the storm in a cloud of snow stirred up by train movement, and the traction motors are right in the middle of the cloud.

Insulation Important

The insulation system must be as moistureproof as possible. Armatures will withstand moisture if the varnish is the right type and is maintained in good condition. The armature coil insulation should be constructed of materials that will not absorb moisture and that have binders that will not be driven off through aging. Field-coil insulation is similar to armature insulation but seems to be more vulnerable to moisture. Special attention should be given to sealing the joints where the leads come out. The newer epoxy resins are showing better moisture resistance. Brushholders and frame wiring can cause electrical breakdowns and flashovers if not kept clean. The creepage path over a brushholder insulator, for example, can become critical when it gets wet if it is dirty with carbon dust.

One example of what can be done to improve the imperviousness to moisture of field coils is a test that has been developed and applied to new and repaired field coils on the Long Island. The insulation resistance of each coil is measured while submerged in water, using a 1,000-volt megger. To be acceptable, a minimum reading of 1 megohm must be obtained after 10 min.

Experience of the Pennsylvania with epoxy resins over the past six years was reported by John Kuscharsey and W. E. Kelley of the PRR.

Much of the traction rotating apparatus requiring costly and heavy repairs can be rehabilitated at a fraction of the former cost with these materials, it was reported (RL&C, Sept. 1959, p 87; Oct. 1959, p 61).

The reliability of this rehabilitated apparatus has been proved by increased service life. Less frequent attention is required for the electrical components.

Despite the progress made with epoxy resins, it can not be assumed that the system is foolproof. Failures will occur, but with reduced frequency. In order to reduce these failures to a minimum, the use of proper resin formulations and application techniques is necessary and can not be overemphasized.

Thermal aging from overloading and operating through a wide range of temperatures, together with exposure to mechanical stresses, rapidly degenerates mica-splitting binding materials made up of organic wrappers, shellac binders and rag papers. If disturbed, such insulation crumbles readily. Repair on the PRR formerly required re-

insulation of field coils and rewinding of armatures.

Effective application techniques, utilizing evacuation of contaminants, impregnation with epoxy resin at high pressures, and controlled curing drastically reduce the need for rewinding traction rotating apparatus. Complete fill with a solventless epoxy resin reunites all remaining basic insulation components, bonds them to the conductors and core iron, and combines the entire system into a void-free mass. This method for rehabilitation of electrical apparatus produces a good insulation resistance and dielectric strength.

A sampling, over a two-year period, of approximately 500 d-c traction armatures retreated with epoxy resins showed a failure rate of 1.01%. Another sampling, for the same period, of approximately 500 d-c traction armatures impregnated with a thermosetting phenolic varnish exhibited a failure rate of 15.5%.

Traction rotating apparatus, shopped for insulation resistance less than 1 megohm at 2,500 volts d-c on armatures, frequently must be rewound because of inability to increase this resistance to satisfactory limits by normal cleaning, baking, and evacuation techniques. Frequently, this low resistance is the result of porosity and looseness in the insulation structure, in which condition vapor contaminants permit flow of current to ground. Vacuum-pressure-cure techniques, using solventless epoxy resins, will generally increase insulation resistance to a serviceable level. To date, experience with this type of defect is limited to approximately 95 armatures over a two-year period. In this sampling, it has been possible to increase insulation resistance from as low as 50,000 ohms to a level of 800 megohms. In three cases, it was not possible to increase insulation resistance and it became necessary to rewind the armatures. In the remaining armatures, the average insulation resistance level, after epoxy treatment, was raised to approximately 250 megohms.

Roasted field coils and overheated armatures which caused flow of solder in commutator risers and wire bands contributed to costly and excessive failures of one type of traction generator rated at approximately 1,050 kw. Reduced operating temperatures resulting after equipping these generators with epoxy-impregnated field coils resulted in a significant reduction in failures:

Year	No. of failures	% of ownership
1956	156	52.9
1957	111	37.6
1958	Record incomplete	
1959	73	24.7
1960	65	22.0
1961	26	8.8

Armatures dragged on pole pieces because of bearing failures have "dragged" iron on the armature core. This formerly required replacing damaged core iron and rewinding the armature. Usually, the insulation adjacent to the periphery of armature core iron, although damaged, provides sufficient dielectric strength against grounds. Removal of dragged iron with a high-speed abrading wheel and replacement of damaged coil wedges, followed by vacuum pressure impregnation with a solventless epoxy resin, will, in some cases, make it unnecessary to strip and re-core the armatures. Twelve such armatures have been in road freight service for approximately two years. The expected core iron tooth losses apparently are not of sufficient magnitude to produce areas of distress.

Four epoxy resin formulations and techniques have been used for impregnating a-c traction-motor armatures. Exposure of these armatures to snow conditions in 1960 and 1961 showed the importance of selecting proper insulation-resin combinations and effective application techniques. These armatures were compared with those treated by dipping or impregnation in conventional phenolic thermo-setting varnish. The results are illustrated in the following tabulation:

	No. of armatures impregnated	% failure
Epoxy A	245	7.3
Epoxy B	154	0
Epoxy C	20	0
Epoxy D	6	0
Varnish	1,243	19.3

Economical Electrification

Railroad electrification does not present the operating and maintenance difficulties usually claimed by its opponents, L. B. Curtis, assistant engineer, Pennsylvania, reported. A survey of 16 U.S. and foreign electrified railroad operations sought information on such factors as the fixed plant and maintenance costs, and the difficulties imposed on operation and roadway maintenance by catenary clearances and outages.

The commercial frequency, high-voltage electrification is the most economical system and will undoubtedly be the system used for major electrifications in the U in the future. Financing plans will be available to make the investment less burdensome. With smaller structures, less overhead wiring and fewer substations, this system will also reduce maintenance costs.

When properly proportioned, the cost of changes to the communication circuits will not be large and will produce a modern plant with greatly reduced maintenance and interference from the weather. Signal changes are necessary, but the increased cost of these changes can also be minimized.

The increased cost of track maintenance has been over-emphasized and, even in foreign countries where the normal contact wire height is lower than that in the U.S., they do not consider electrification a factor in increasing track maintenance costs. The increased cost of bridge and tunnel maintenance is negligible, particularly when such maintenance can be done during periods while the catenary is de-energized.

The limitation that electric locomotives can move only over tracks equipped with a trolley system is a minor problem when the electrified section is supplemented with diesel-electric locomotives for yards, lightly traveled track, and industrial spurs. The delay of a number of trains in a section due to catenary trouble and outage is no more serious than delays for various causes outside of electrified territory.

There is no question that there is some additional expense for restoring track and electrification facilities after wrecks and derailments, but the increased cost is less than might be anticipated.

Piggyback operation has been hampered in certain locations by low contact wire, usually under overhead bridges and in tun-

(Continued on page 41)

Orders and Inquiries for New Equipment

Placed Since Closing of January Issue

Diesel-Electric Locomotive Orders

DENVER & RIO GRANDE WESTERN.—*Electro-Motive:* 13 GP-30 locomotives.

KANSAS CITY SOUTHERN.—*Electro-Motive:* 10 GP-30, 2,250-hp locomotives for general road service.

Freight-Car Orders

AMERICAN REFRIGERATOR TRANSIT. — *General American:* 102 50-ft, 70-ton RBL refrigerator cars. To be equipped with load dividers, roller bearings, Hydra-Cushion underframes, and 10-ft wide plug doors.

FRISCO.—*ACF:* 150 70-ton, 50½-ft box cars. To be equipped with Waugh-Evans 20-in.-travel Hydracushion underframes, roller bearings, and 10-ft sliding doors. For delivery this month.

FRUIT GROWERS EXPRESS.—*Company shops:* 269 50-ft, 70-ton refrigerator cars; 114 40-ft, 50-ton refrigerator cars. All 383 cars insulated, bunkerless RB and RBL types. Approximate cost, $6,700,000. All 50-ton cars and 219 of 70-ton cars to have loading devices. 225 of 70-ton cars also to have cushion underframes.

ILLINOIS CENTRAL.—*Company shops:* 500 50-ton, 50½-ft, double-door box cars. Scheduled for mid-year completion. Also authorized are 50 70-ton, 60-ft flat cars for completion in April and May.

NEW YORK CENTRAL.—*Greenville Steel Car:* 150 Flexi-Van flat cars. Deliveries to begin next month.

NICKEL PLATE.—*International Car Div., Morrison International:* 50 steel bay-window cabooses. Delivery to begin in March.

MISSOURI PACIFIC.—*Pullman-Standard:* 400 50½ ft, 70-ton box cars. Approx. cost, $5,350,000. Order to be completed in May. 300 cars to be equipped with Cartridge bearings supplied by Clevite Graphite Bronze Division of Cleveland. Other 100 cars to be roller-bearing equipped.

UNION PACIFIC.—*Company shops:* 250 hoppers.

UNION TANK.—*Company shops:* 58 30,000-gal and 29 20,000-gal capacity tank cars.

WABASH.—*Pullman-Standard:* 100 70-ton covered hopper cars; *General American:* 100 70-ton Airslide hopper cars; 50 insulated, 50-ft, 70-ton Hydra-Cushion box cars. Hopper cars to be equipped with special pneumatic loading and unloading devices. Box cars to have special hydraulic devices to reduce shock.

Notes and Inquiries

Denver & Rio Grande Western plans to purchase 325 new roller-bearing freight cars in 1962 as part of a $7.1-million equipment program. Included are 200 70-ton triple open hopper cars, 50-ton, 53½-ft flat cars with reinforced bulkheads and 100 70-ton, 53½-ft insulated box cars equipped with loaders. Road will also spend $1,215,400 for the construction of combination diesel repair and back shop facilities at Burnham (Denver), Colo.

Santa Fe has programmed $65 million for capital improvements during 1962, including acquisition of 43 heavy-duty diesel locomotives, 1,200 freight cars, and 25 new baggage cars. Shells for the latter have been ordered from Pullman-Standard.

Wabash to rebuild 350 general merchandise cars at its Decatur, Ill., shops.

Western Pacific board of directors has adopted a $4 million budget for purchase of new equipment in 1962.

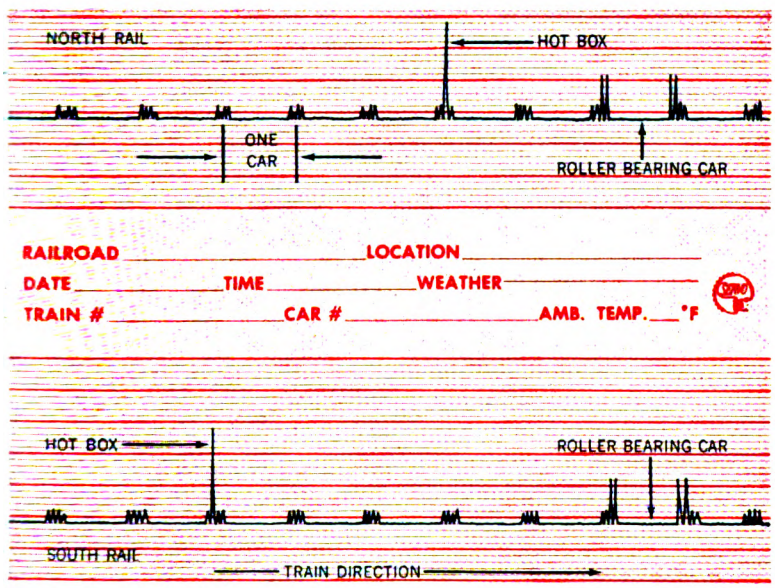
ARE YOU CAUGHT IN A 'BARN DOOR' MAINTENANCE PATTERN?

Maintaining heat-damaged journals is like closing the barn door after the runaway. Once repaired, wheel assemblies can roll again—but only at increased cost and lost time for added maintenance.

By contrast, consider the railroad with an approach-to-yard SERVOSAFE® Hot Box Detective* system, keyed to a program of selective maintenance. Minutes before the train enters the yard, inspectors and their crews have a "log" of every journal on it. This tape, beamed from infrared scanning units a few miles away, indicates and gives the exact location of any overheated journal assemblies. Maintainers go directly to these locations... concentrate their time on *servicing* hot boxes, not *looking* for them.

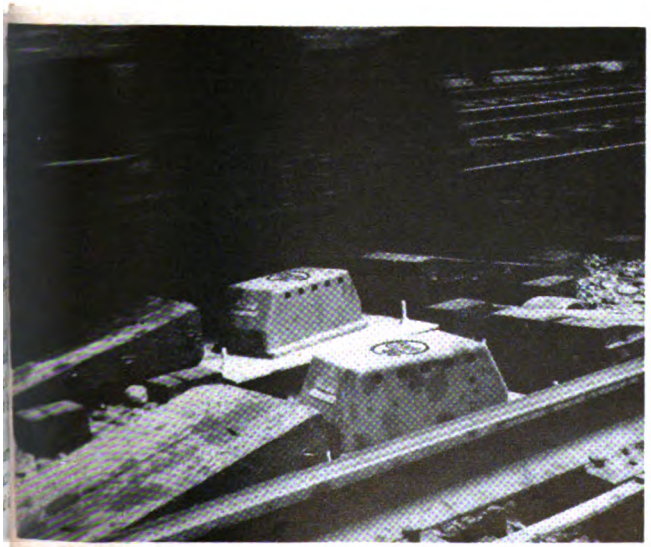
SERVOSAFE® Hot Box Detective Systems save time and money on the main line, too. Their 100% inspection, and the concentrated yard maintenance based on its results, greatly reduce the chance of faulty bearings on outgoing trains... nip incipient hot boxes in the bud to prevent costly bearing damage, burnoffs, and derailments.

SERVOSAFE® Hot Box specialists have more than eight years' experience in the early detection of hot boxes. Get with them soon and blueprint your own program for increased yard efficiency based on selective maintenance and SERVOSAFE® Hot Box Detective Systems.





In the yard, a SERVOGRAPH® Recorder tapes the relative heat of each journal on approaching trains. Normally high-temperature roller bearings are readily distinguishable as groups of four high pips. Suspected hot boxes show well above the normal mean.



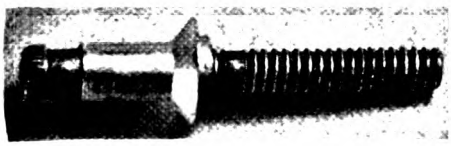
Outside the yard, 100% incoming inspection... automatically proportioned to train speed... is provided by the SERVOSAFE® Hot Box Detective System. Trackside scanners like these sense infrared heat radiation from each passing journal.

Railroad Products Division

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**Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.*



Blind Bolt

A special locking collar that locks fastener pin positively is a feature of the Huck alloy-steel blind bolt which has a shear strength of 95,000 psi. The fastener is installed from one side of the work so that the pin and part of the sleeve are on the blind side. The nose of an installation tool is placed over the pintail end. As power is applied, the pintail is pulled to bulb the blind side, the collar is driven into a positive lock, and the pin is ruptured flush with the work surface. Nominal sleeve diameters are 5/32, 3/16, 1/4, 5/16, and 3/8 in. The bolts are available in 1/16 grip increments and in two head styles —flush and protruding. *Huck Manufacturing Co., Dept. RLC, P.O. Box 7790, Detroit 7, Mich.*

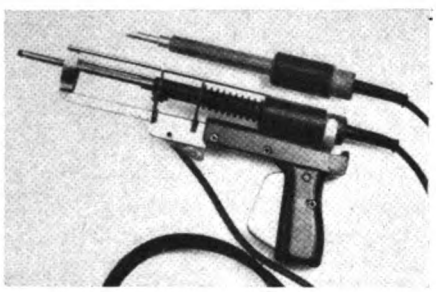
Rust Solvent

A 4-oz size has been added to the 12-oz, pint, and gallon cans of Spray Nuts Off, a combination of oils, penetrants, and chemicals formulated for loosening "everything rusted or corroded." It is said to provide fast solvent and penetrating properties for loosening stud bolts in aluminum heads, for cleaning carburetors, and for cleaning crankcases when added to the oil before it is changed. *Spray Products Corporation, Dept. RLC, P.O. Box 1988, Camden 1, N.J.*



Wet Valve Face Grinder

The Sioux No. 624 valve face grinding machine has been designed to grind valves for the smaller four-cycle gas and diesel engines. The Sioux roller-type, self-aligning chuck has been redesigned to accommodate the smaller valve stem diameters and a grinding head which employs the Sioux bearing design. The coolant system is self contained and is designed for use with all Sioux grinding oils. Only .010 in. to .015 in. movement is required to engage or disengage the self-aligning, cone-type clutch. *Albertson & Co., Dept. RLC, Sioux City 2, Iowa.*



Spot Welder and Soldering Iron

A soldering iron and a gun-type frame incorporate the Model 12-051 soldering iron into a portable arc spot welder. For soldering, the iron is removed quickly from the frame. An adapter permits the use of two sizes of special soldering electrodes which can be changed without the use of tools. The soldering iron has greater heat output than the normal resistance type iron. Recommended amperage range is 30-70 amp a-c, 30-90 amp d-c. As a spot welder, the tool, which works off any low capacity a-c or d-c power source, uses a 6-in. cored carbon-welded electrode. *Arcair Co., Dept. RLC, Lancaster, Ohio.*

Sonic Cleaner

Large components or batches of small parts can be cleaned in the Model SEC-1825-N sonic energy cleaner. The unit combines a 1,500-watt generator and a 28-gal cleaning chamber which measures 18 x 25 x 14½ in. deep. Sonic energy at 21 kc frequency is developed through 10 Omnimite magnetostrictive transducers metallically bonded to the bottom of the chamber which is ¼ in. thick. *Bendix Corp., Pioneer-Central Div., Dept. RLC, Davenport, Iowa.*

Temperature Control

A highly accurate mercury thermostat, it is said, is used in a new anti-ice temperature control designed for use on trucks, railroad cars or other applications where temperatures are to be held within certain ranges automatically. The device will prevent



freeze-up of standing equipment and control other devices within any preset temperature range. Underheat or overheat conditions can be detected to set off alarms. The unit controls electric power up to 2[illegible] amp for electric heater cables, fire alarms, immersion units, or any other form of heating or cooling devices. Operation is from 115 or 230 volts a.-c. *Vap-Air Division of Vapor Corp., Dept. RLC, 6444 W. Howard st., Chicago 48.*



Vitaflex Hose

Vitaflex hose combines extruded Teflon tubing and high-strength bronze wire braid sheath. It is used to convey chemicals, fuels, air, gas, liquids, steam and hot water, and is said to maintain its properties through temperature ranges of —100 to 500 deg F. *Atlantic Metal Hose Co., Dept. RLC, 300 Dyckman st., New York 34.*

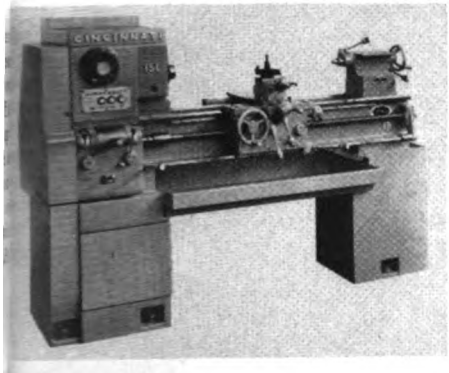
Hopper-Car Lining

The Flintflex lining system for covered hopper cars—a special undercoat, usually followed by two top coats of a competely different type of finish—is said to protect loads from contamination by metal oxides or prevent early corrosion of the car because of chemical attack by the material being hauled. The lining is recommended for cars used to ship dry bulk foods, such as wheat and flour; hyperpure chemicals, such as polyethylene molding resin, and abrasive

naterials, such as phosphate rock, cement, and salt. It is smooth, flexible, and abrasion resistant, and complies with Food and Drug Administration regulations. *Du Pont Co., Dept. RLC, Room D-8167, Wilmington 98, Del.*

Oil-Mist Collector

Heavy wiring and expensive electrical connections are eliminated with the new AAF oil-mist collector designed for use with wet-machining operations. The unit is available in two arrangements—with or without inlet plenum. A fan mounted to the inside top of the unit pulls the oil mist into the glass-fiber cartridge, and air is recirculated as it is exhausted. The cartridge is collapsible. A built-in visual indicator tells when it should be replaced. The collectors are available in three standard sizes—500 cfm (12 x 24 x 32 in.); 750 cfm (24 x 24 x 32 in.), and 1,000 cfm (24 x 24 x 32 in.) Weights range from 70 to 93 lb. The cartridge weighs but 3 lb. *American Air Filter Co., Dept. RLC, 215 Central ave., Louisville 8, Ky.*



Light-Duty Lathe

Productivity of the Cincinnati Model 15L Hydrashift 15-in. lathe is increased by dialed pre-selection of spindle speeds and automatic gear shifts. Two spindle ranges are available: standard, 35 to 1,200 rpm, and a high of 53 to 1,800 rpm. The standard 3-hp motor handles both speed ranges. Swing capacities are 15½ in. over the bed and 11 in. over the cross slide. Distance between centers is 24 to 60 in. Carriage feeds range from 0.0020 to 0.1224 ipr and cross slide feeds from 0.0005 to 0.0310 ipr. Range of threads is 3 to 184 per in. Carriage cross-slide travel is 9 in., and top slide travel is 2⅜ in. *Cincinnati Lathe & Tool Co., subsidiary of Cincinnati Milling Machine Co., Dept. RLC, Cincinnati 9, Ohio.*

Portable Vacuum Cleaner

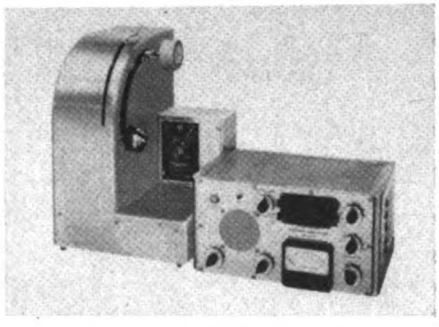
The contour of the Hoffcoback portable cleaning tool makes it easy to mount on the operator's back, as well as on the floor and wall. The tool, of high impact copolymer plastic and synthetic rubber construction, can be converted from vacuum action to blower action. Wind suction is created by a 1-hp, a-c/d-c universal motor, coupled



with a multi-stage turbine. A full 360-deg swivel permits left- or right-hand use. *Commercial Vacuum Cleaning Div., Hoffman Industries, Inc., Dept. RLC, 103 Fourth ave., New York 3.*

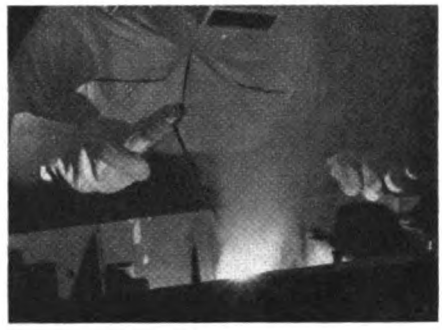
Improved Cor-Ten Steel

A new patented steel improvement, according to Leslie B. Worthington, president of U.S. Steel, "greatly extends the range of usefulness of . . . Cor-Ten high-strength low-alloy steel," and imparts—in thicknesses three times as great as before—the same high strength and full weldability as the alloy. Cor-Ten steel, in thicknesses up to 1½ in., now has a minimum yield point of 50,000 lb per sq in. and is weldable by all conventional techniques. These properties, according to Mr. Worthington, were previously available only in Cor-Ten steel products up to ½ in. thick. *United States Steel Corp., Dept. RLC, 525 William Penn Place, Pittsburgh 30, Pa.*



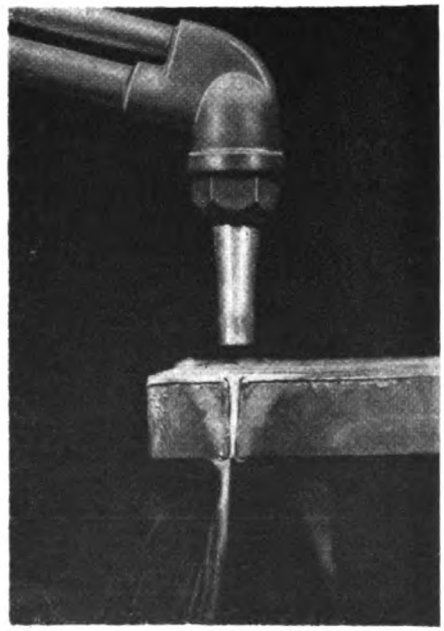
Bearing Inspection System

Surface defects on raceways and rolling elements and operating characteristics of retainers and shields of completely assembled sliding ring and self-aligning bearings can be evaluated on the Model BA-20-2HV analyzer. The unit is applicable either for new bearing analysis, or as an instrument for use in bearing reclamation programs. Dynamic analysis is achieved through a Go-No-Go quality meter to evaluate the severity of a defect, an integral oscilloscope to determine the position of the defect, and an audio signal system that provides constant audio monitoring through the testing operation. The standard chuck is capable of handling 97% of all bearing sizes, either new or used, dry or lubricated, ball or roller. The system consists of an electronic unit and a drive unit and operates on 115 volt, a-c. The unit weighs 45 lb. *Bearing Inspection, Inc., Dept. RLC, 3311 E. Gage ave., Huntington Park, Calif.*



Cast-Iron Electrode

The EutecTrode 27, an a-c/d-c electrode with non-conductive coating, is said to permit rapid deposition, ease of application, and all-position welding with savings in time and labor. It is for use on all types of cast-iron repairs where machinability is not required. *Eutectic Welding Alloys Corp., Dept. RLC, 40-40 172 st., Flushing 58, N.Y.*



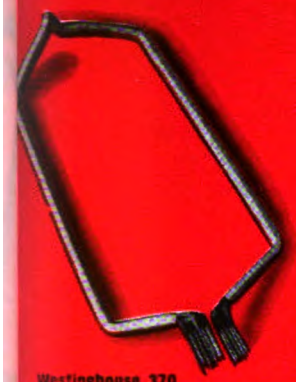
Fuel Gas Cutting Nozzles

The Oxweld 154 Series flame-cutting nozzles are designed for use with Oxweld C-31, C-32, or C-66 hand-cutting torch, and C-67 machine-cutting torch. Six nozzle sizes are available for cutting thicknesses from ½ to 30 in. Either natural gas or propane is used. *Linde Co., Division of Union Carbide Corp., Dept. RLC, 270 Park ave., New York 17, N. Y.*



E. A. KUHN
MECHANICAL ASSISTANT
TO
SENIOR VICE PRESIDENT

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Armature Coil



Westinghouse 480
Generator Coil



E.M.D. D-8
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E.M.D. D-12
Generator Coil



General Electric 752
Armature Coil



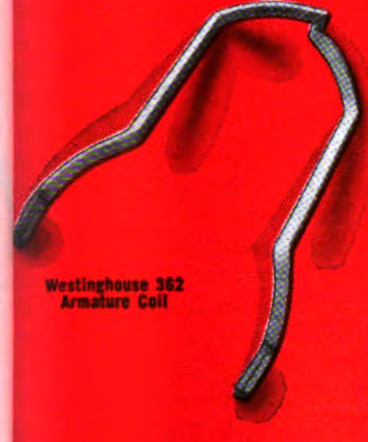
Westinghouse 471
Generator Coil



Allis-Chalmers
Stator Coil



E.M.D. D-15
Generator Coil



Westinghouse 362
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Southern Electric now offers, after careful research, a superior flexible and stronger bonded insulation system known as "Sepoxy".

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EDITORIALS

Today's Safety Appliances

Jurisdiction of the Interstate Commerce Commission over maintenance and design of cars and locomotives is over a half-century old. Both the Bureau of Safety and Service and the Director of Locomotive Inspection have just issued their fiftieth annual reports.

As originally passed in 1911, the Locomotive Inspection Law was "to promote the safety of employees and travelers upon railroads by compelling common carriers . . . to equip their locomotives with safe and suitable boilers and appurtenances thereto." By 1915, the scope was expanded to cover "the entire locomotive and tender all parts and appurtenances." In 1926, "locomotives other than steam" were brought under the Inspection Law and, in 1956, "multiple-unit cars" were included.

During this time the equipment covered by the Locomotive Inspection Act has undergone a complete change. If the Bureau had been restricted to boilers alone, there would be little to do around today's railways.

Those responsible for enforcement of the Locomotive Inspection Act have updated their inspection requirements as motive power has changed. Starting in 1954, the regulations covering locomotives other-than-steam were completely revised. The regulations had been written in terms of the electric locomotives which were the "other-than-steam" motive power of 1926. By August 1957, the railroads had a set of federal locomotive inspection requirements which were written in terms of the diesel locomotives they were using. Even though many may not agree with all phases of the current Rules, it must be agreed that they are less complicated than the electric-locomotive rules which were applicable until 1957.

When it comes to safety appliances on cars and locomotives, U. S. Safety Appliance Standards of 1911 are still in effect. Almost every piece of rolling equipment described in 1911 regulations has been so changed that even the same general types must frequently be treated as exceptions.

Starting about 1954, the Bureau of Safety and Service undertook a revision of these standards. At that time the Bureau's assistant director stated that standards applicable to new types of rolling stock had to be based on the Commission's general rule stipulating that cars of construction not covered specifically by the 1911 order "shall have, as nearly as possible, the same complement of handholds, sill steps, ladders, hand brakes and running boards as are required for cars of the nearest approximate type."

The Bureau produced a proposed revision in 1955 which railroads called "costly" and said could have serious effects on their operations. Since then, little more has been done in the way of a general revision. New types of rolling stock continue to be treated as exceptions. The protracted action involving the Union Tank Company and the ICC, reported many times in these pages, is an example of the application of 1911 regulations to a 1957 ca design. This would seem to be an area where change is long overdue.

Journal Bearing Economics

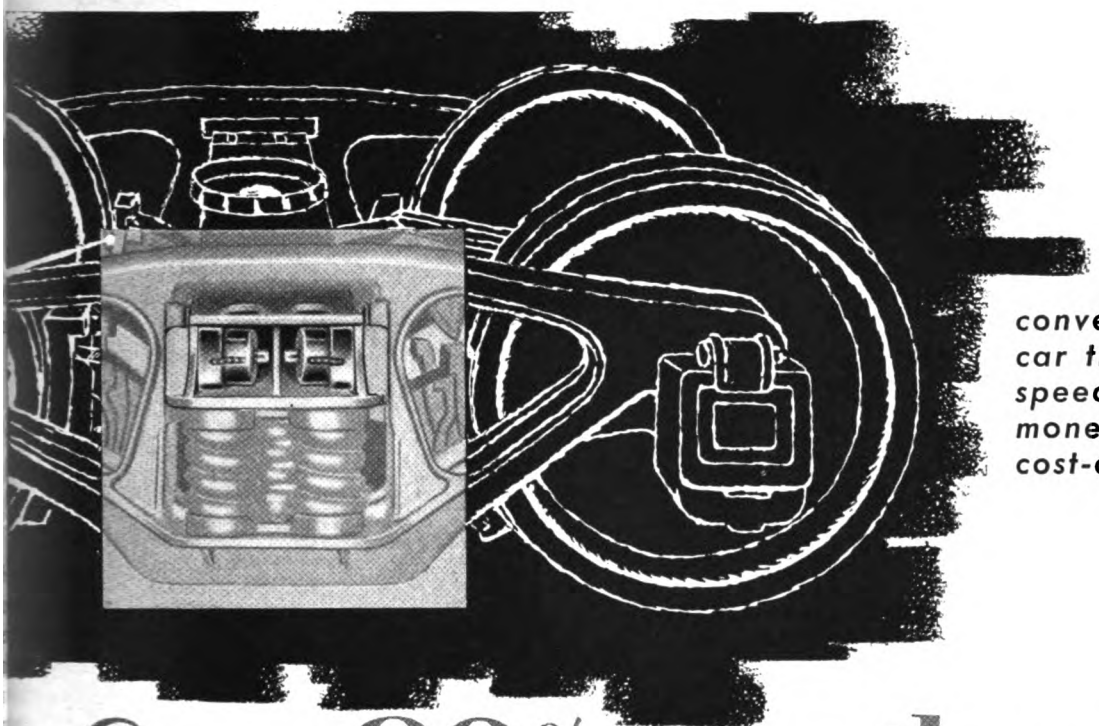
Latest hot box data from the AAR Mechanical Divisio shows for October 1961 a total of 4,773 hot boxes, a average of 574,397 miles per hot box car set off betwee terminals. This is almost double the next best mileag since 1950—293,796 miles in 1953. Probably it is mor significant that less than half of the hot boxes occurred on lubricator-equipped cars, now comprising more than 80 % of the fleet.

This reduction in hot boxes is an achievement for which the AAR Mechanical Division can be justly proud. The AAR Interchange Rule making it mandatory to replace waste in plain bearing journal boxes with lubricators did not involve decisions made overnight, or without opposition. The capital investment involved for more than two million cars will be considerably over $50 million. Since making lubricators mandatory, there have been continuing efforts to improve the pads themselves and to effect other improvements in the journal assembly. These changes have improved the performance of the plain bearing and, undoubtedly, even better results will be achieved.

How these lubricators and other improvements have affected plain-bearing economics was the target of a study made by the Magnus Metal Corporation reported in this issue. Basing its study on AAR Report 20000, "Comparative Economics of Journal Bearings," published in November 1955, the new study updates only that part of the AAR report dealing with plain bearings. Magnus states that the operating cost of lubricator-equipped plain journal bearings is less than half that of the waste-packed type as determined by the AAR in 1955. It also draws other conclusions, one being that, on the basis of the new data, the installation of roller bearings is not economically justified.

We doubt that the conclusions made by Magnus will go unchallenged. And we will be glad to report answers that may be forthcoming from manufacturers of other bearings. However, we would like to suggest that a study of the current economics of both plain and roller-bearings by an unbiased agency would be worth while. The AAR could perform a real service by updating all of Report 20000.

Differences of opinion about the economics or merits of journal bearings do not detract from the accomplishments of the past few years. All types of bearings are contributing to the solution of the hot-box problem, probably the most vexing mechanical department men have had to solve.



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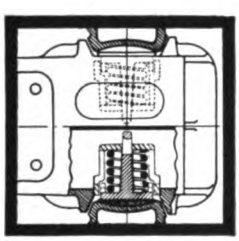
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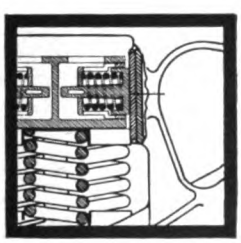
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NEW



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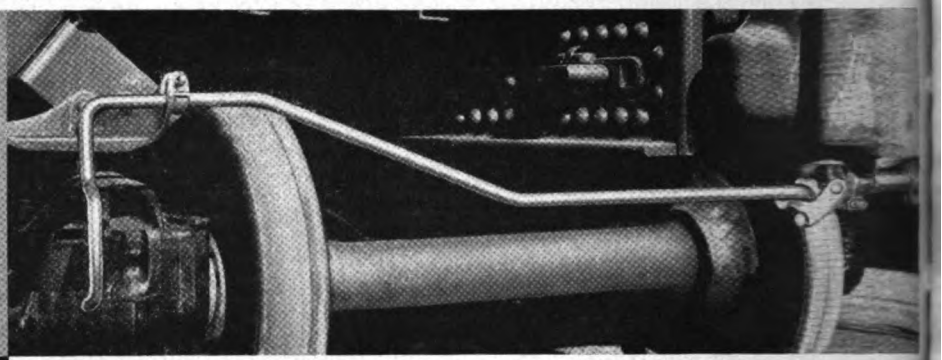
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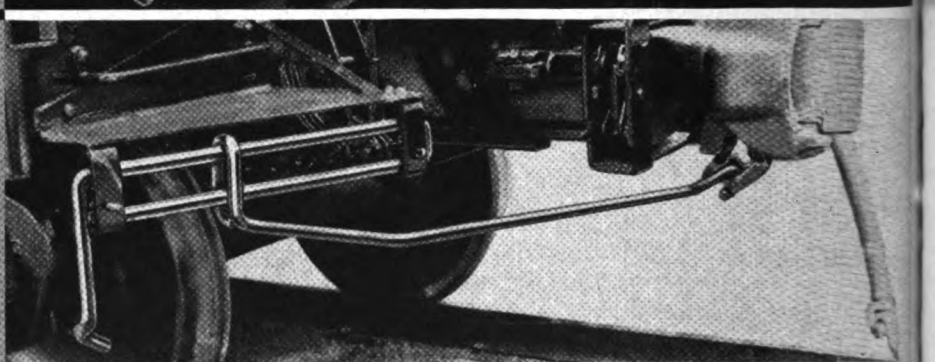
STANDARD
ROTARY



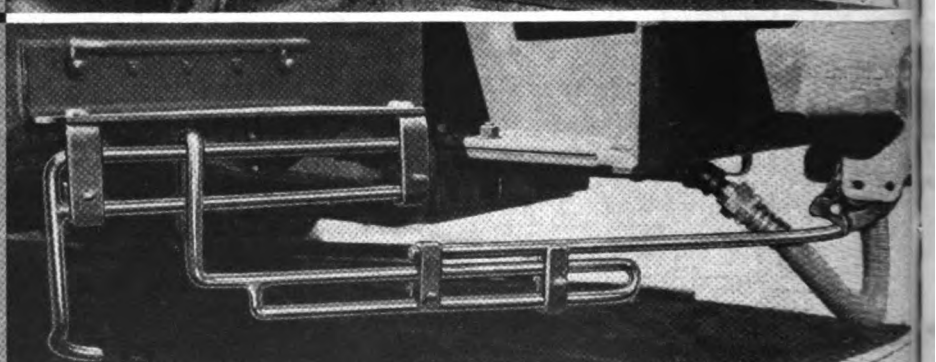
STYLE NO. 1
CONVENTIONAL
AND MINIMUM
CUSHION



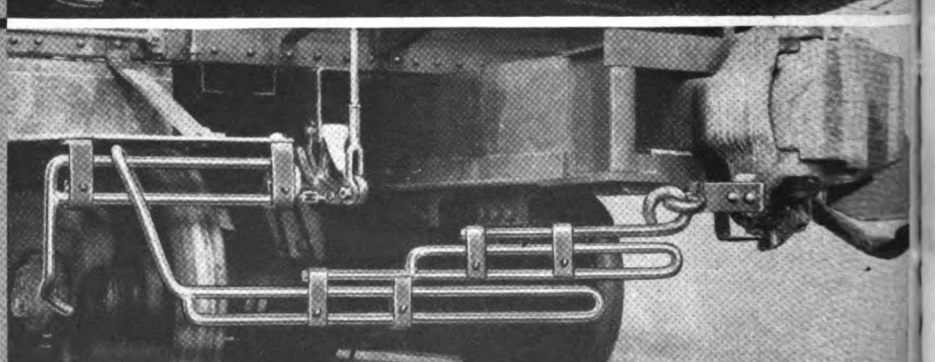
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For a half century Standard Railway Engineers have kept pace with the times by providing Coupler Operating Devices to meet all changes in design of draft gears, couplers, strikers and cars.

For many years Coupler Operating Devices were required to meet only normal draft gear conditions. With the advent of longer travel draft gears and cushion underframes as well as increased car lengths, it became necessary to provide a new design of coupler operating mechanism to suit the latest multiple requirements.

Standard Railway's Style #1 was designed to eliminate any tendency of the rod hook to rotate lock lifter towards lock set position so that it could be used for conventional gear conditions and in minimum cushion underframes.

With the development of increased cushion underframe travel it became necessary to further expand the range of the Coupler Operating Device to stay within safety law requirements. This was accomplished with the development of Styles 2, 3 and 4.

Standard Railway can furnish a Coupler Operating Device to suit any coupler travel from normal draft gear conditions to cushion underframes with as much as 60 inch travel, that is 30" buff and 30" draft. At the same time Standard Railway furnishes a Coupler Operating Device to suit any striker opening required for the cushion underframe specified. See your Standard Railway representative for further details.

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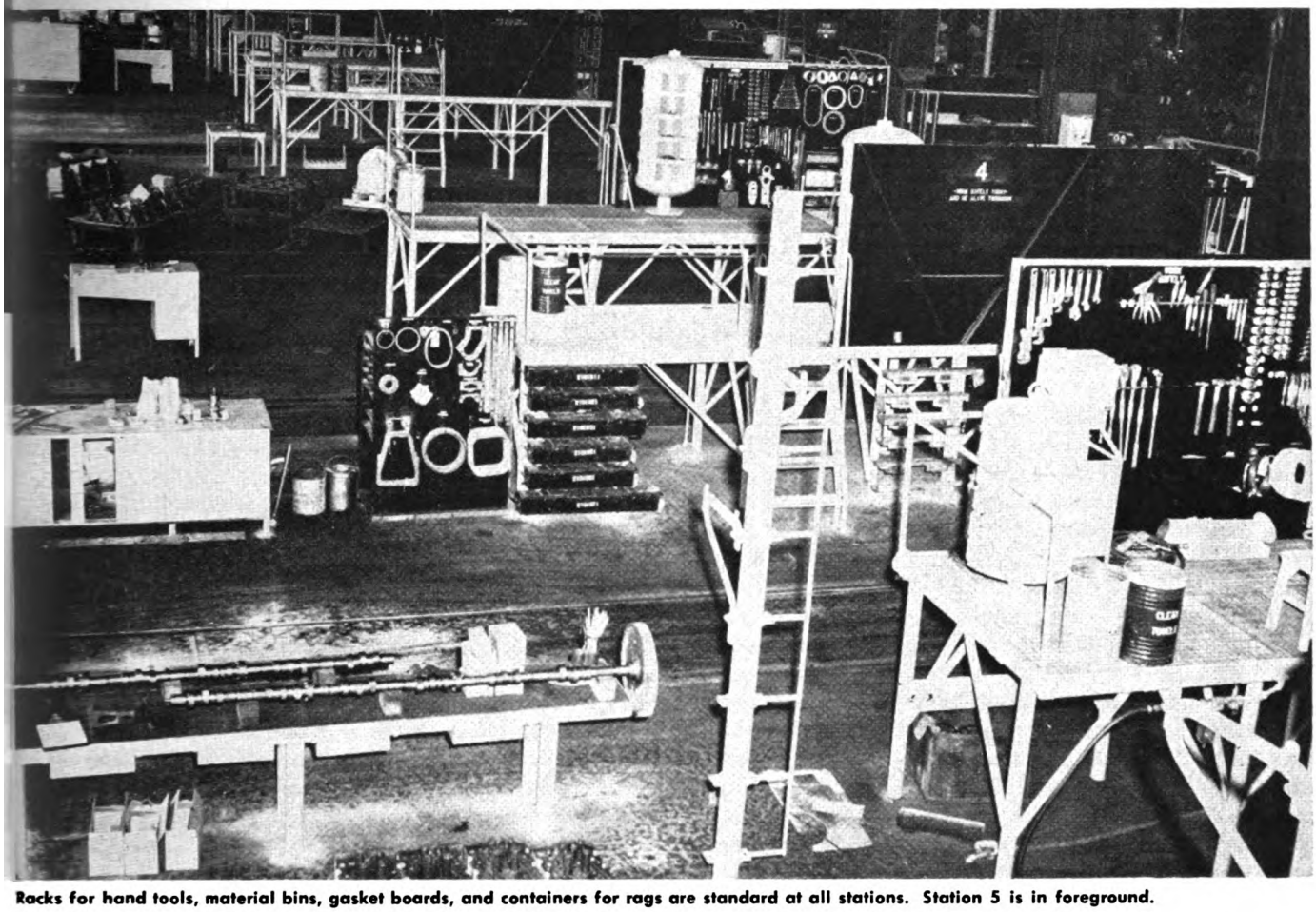
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Racks for hand tools, material bins, gasket boards, and containers for rags are standard at all stations. Station 5 is in foreground.

Spot System for Heavy Diesel Repairs

Louisville & Nashville applies running-repair techniques to its complete overhaul operations

The spot system for periodic inspection and maintenance of locomotives has now been adapted to heavy diesel locomotive repairs by the Louisville & Nashville. This progressive station system for heavy repairs went into operation at the road's South Louisville, Ky., shop on August 7.

The new L&N procedures are based on Locomotive Maintenance Officers Association study of spot shop operations presented last September (RL&C, Oct., 1961, p 18). While in the LMOA report three basic enginehouse arrangements — the straight-through shop, split-track shop, and roundhouse-shop—were discussed, the L&N has arranged its series of work stations on the parallel tracks in its main back-shop building. Mechanical officers of the road believe the back-shop application is the first in the United States to utilize "enginehouse production-line" methods.

From the start of operations in August to late November, 31 Alco and five EMD units went through the system on schedule. Class 3 repairs, which include replacement of the engine, were given one Alco and three EMD units during this time. The remaining locomotives received lighter Class 4 repairs involving replacement, or reconditioning of components, such as power assemblies, manifolds, and oil coolers.

According to L&N officers, results achieved with the progressive station system include:

- Increased production with minimum expenditure;
- Greater flexibility;
- Better utilization of existing shop area;
- Reduced waste motion;
- Simplified materials handling;
- Better inspection of work;
- Higher work standards;
- Concentrated work, simplifying studies of locomotive condition as related to service hours or mileage;

• Simplified evaluation of locomotive and engine modifications;

• Adjustment of heavy repair shopping periods, resulting in lowered costs.

The L&N mechanical department has been particularly interested in evaluating the many modifications made over the years to Alco and EMD locomotives with the aim of improving their performance and reducing maintenance costs. The spot system is making such evaluation possible. Very little was known as to the actual benefits obtained in terms of extended life of components and effects on diesel engine performance. Presently, all records of these changes are being evaluated to determine if it is possible to lengthen intervals between repairs. Already the schedule for replacement of main and rod bearings, and cylinder assemblies on Alco 244 engines has been extended to three years from the previous two years, based on findings made since the spot system was instituted last August 7.

Various Repairs

Diesel units can be given either Class 3 or light Class 4 repairs on the six-station spot system. This production arrangement is designed to outshop a unit every other day. Specific operations are performed at each work station by assigned personnel. After a unit has been on a station for an established interval, it is advanced to the next station. The process is repeated until the unit is advanced through the entire system. Movement of units from one station to another is usually done at night with the shop's transfer tables. Stations 1 and 6 are the same location outside where load tests are made before a unit enters the shop and again after overhaul is completed. Stations 5, 4, 3 and 2, in this order from Stations 1 and 6, are spaced so there is one empty track between each work station track. Portable platforms equipped with all tools and materials necessary for each station's operation are placed on each side of the locomotive. Should it become necessary to relocate stations on other shop tracks, the platforms and contents can be lifted by the overhead crane. Originally, the stations were in 1, 2, 3, 4, 5 and 6 order. To reduce the handling of parts to be cleaned, both by shop trucks and overhead cranes, the positions of the stations were reversed, bringing Station 2 nearest the cleaning vats.

The L&N, with 522 road units and 211 switchers, concentrates all running and heavy repairs at Louisville. Locomotives scheduled for the back shop are generally those with highest accumulations of mileage since previous classified repairs.

Locomotives sent to the back shop for Class 3 repairs are progressed through the spot line without evaluating their condition at the initial load test station. Typical flow on the progressive line is like this:

Station 1. Monday, at 7 a.m., a unit due for Class 4 repairs, is placed for preload test and inspection, remaining at this station for one half day.

Station 2. Half day Monday and Tuesday.

Station 3. Wednesday and Thursday.

Station 4. Friday and Monday.

Station 5. Tuesday.

Station 6. Wednesday. Load test prior to outshopping.

Initial Evaluation

Units are normally on stations 6 hr. At Station 1, when a unit is put on load test, it is possible to:

• Check oil and water temperatures;

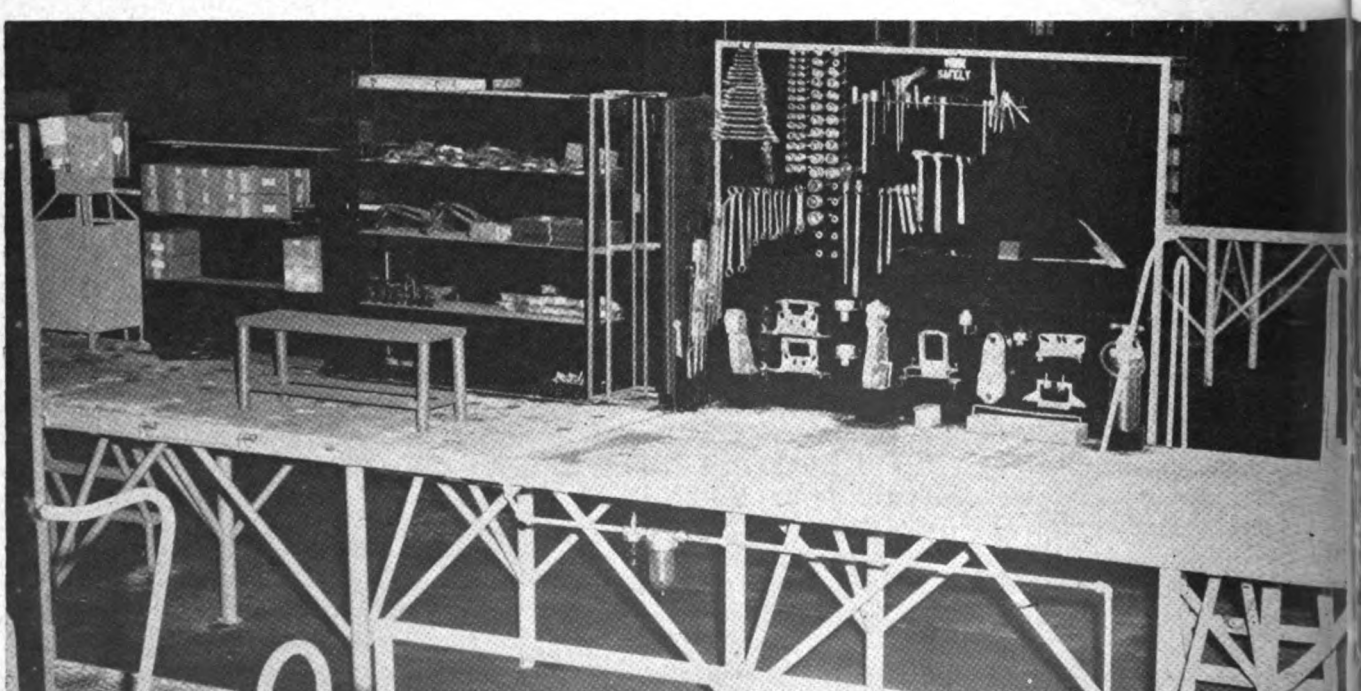
• Test cylinder compression;

• Check electrical output;

• Thoroughly inspect locomotive for general condition;

• Examine the records of main bearing inspections, cylinder removals, oil cooler changes. Spectrographic history of lubricating oil can be evaluated.

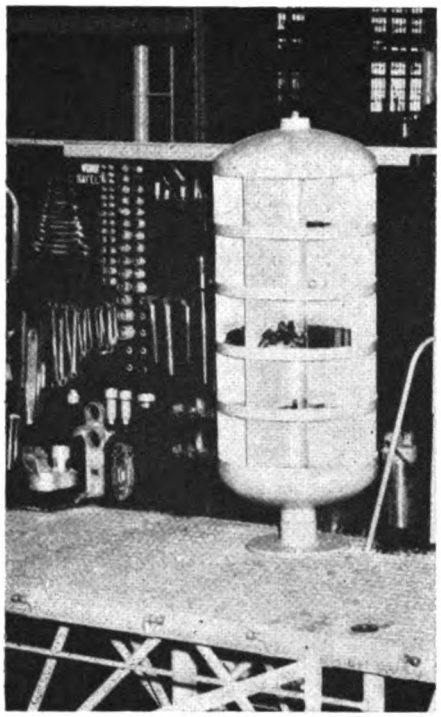
After these tests and inspections, requiring approximately 4 hr, a decision is made either to place the locomotive in the shop and run it through the spot system for classified repairs, or to put it in a bay section for correction of



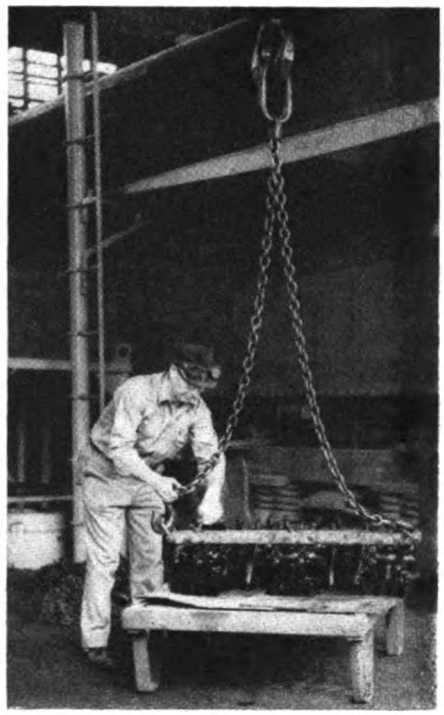
Tools and parts are neatly arranged on platforms at Station 3. Reconditioned power assemblies are applied to clean crankcase at this point. Such parts, cleaned, inspected and rebuilt elsewhere in the shop, are placed on these work platforms by the overhead crane.

specific defects so it can be returned to service without classified repairs. In this way, maximum utilization of locomotives is obtained, postponing class repairs until they are actually needed.

Should extensive Class 3 repairs be required, major locomotive components are removed at Station 2. These can include the engine, main generator, air compressor, and other assemblies which are replaced with other fully assembled, overhauled components. Following removal, the inside of the carbody is cleaned on the second shift by two laborers. On the second day at Station 2, these major components are replaced. At Station 3, all parts are aligned and tightened down. Work on the locomotive is finished on Station 4. The cooling system is filled and the unit is moved to Station 6, bypassing Station 5 unless trouble develops.



Bins for small parts are tagged to show the maximum and minimum stock to be maintained.



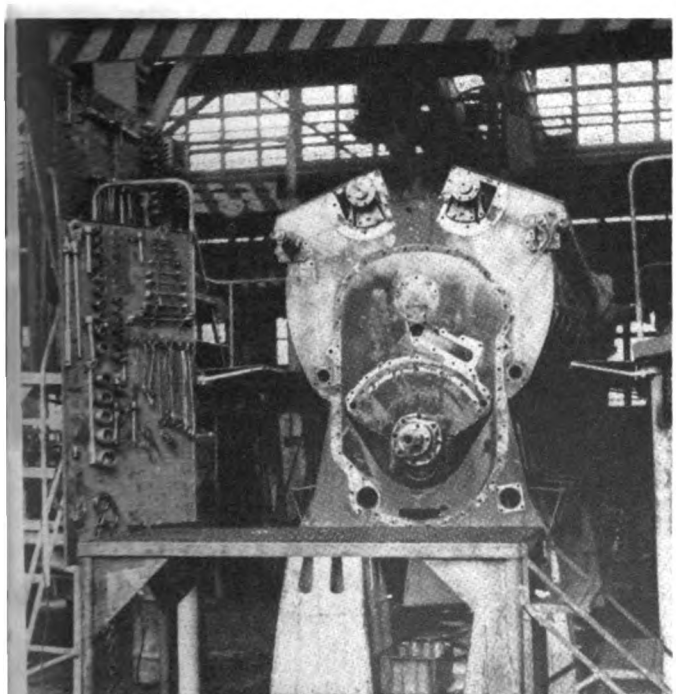
Fixture makes it possible to remove three Alco rocker arms at one time for reconditioning.

Flexible System

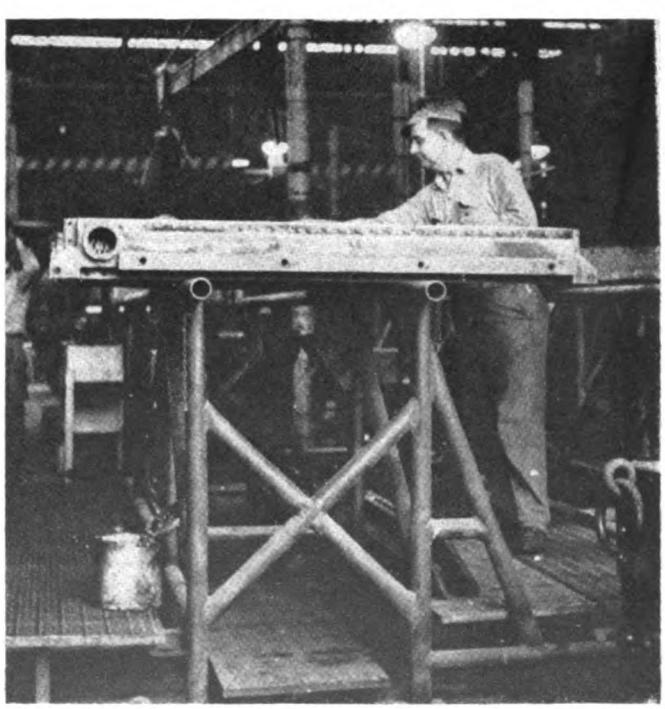
Flexibility of the line permits use of Station 5 for special repair work. The L&N believes results obtained from such methods are making possible maximum service between heavy repairs. When inspection shows that the oil cooler or the radiators are to be reworked, these items will be handled at Stations 2, 3, 4 and 5 as manpower is available.

Permanent personnel assigned to stations are all machinists. On August 7, the system operated with 21 machinists. Today, the same work is performed with 15. Other crafts are drawn, generally on a part-time basis, from other shop sections when needed.

At Stations 1 and 6, actually the same location, two machinists handle load tests made before and after the unit is on the progressive line. When the unit is on Station 2, three machinists are assigned. One works on the floor between Stations 2 and 3, handling all equipment removed at Station 2 and stripping parts to be reconditioned. Station 3 has an assignment of three machinists; Station 4, four machinists. Actually, one of these four men works between Stations 4 and 5 on oil-bath filters, camshafts, oil lines, and all reconditioned and cleaned parts applied at Station 4. At



Engine assembly area has tool boards which can be swung around for easy access after engine has been put into position.



Special stands and crane used for work on engine radiators are in area adjacent to, but not rated as one of, the line stations.

Station 5, one machinist is permanently assigned. Two machinists perform various operations between Stations 2 and 5.

Personnel assigned part time on the line includes one electrician and one pipefitter at Station 1. Two pipefitters and one electrician work part time at Station 2, and two boilermakers, one electrician, and two pipefitters at Station 5. Part-time line personnel is equivalent to one full-time electrician, two full-time pipefitters, and one full-time boilermaker.

When a unit is scheduled for Class 4 repairs, it is placed at Station 1 for load test and evaluation of its condition. Because this type of repair does not call for removal of the complete engine, its major components and other locomotive parts are removed at Station 2. Roof hatches or hoods come off. Stripped from the engine are cylinder heads and assemblies, turbosupercharger, exhaust manifolds, nozzles, rocker arms, water manifolds, fuel and oil lines, engine air-intake filters, and, if necessary, camshafts, oil cooler, and radiators.

At Station 3 the crankcase and engine frame are cleaned thoroughly and the main bearings are inspected. After the unit is moved to Station 4, heads, exhaust manifolds, fuel nozzles, rocker arms, and water manifolds are applied; power assemblies and connecting rods are tightened, and pump timing and valve clearances are checked.

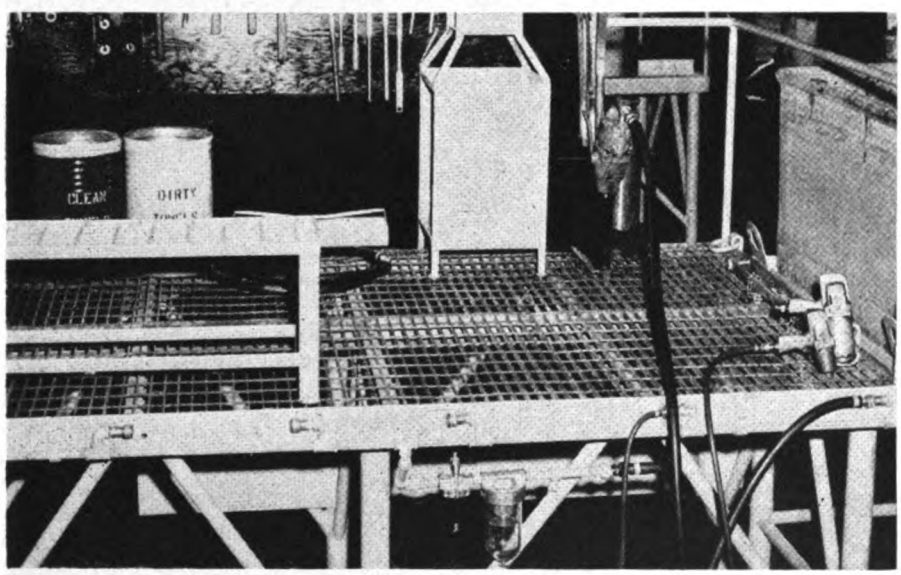
At Station 5, the hood or hatches are set on the unit and secured in place, the engine is water tested, and engine and carbody filters are applied. Turbosupercharger, shroud between exhaust manifold and turbo, and fuel and oil lines are normally applied while the unit is on Station 5, but two machinists may go to Station 4 and make the applications before the locomotive is moved.

Equipment on the platforms includes tool boards, skids and racks for parts removed, steel stands, hose reels, material bins, and gasket boards. Among the specialized tools provided at the four work stations, one set for each side of a unit, are the following: Station 2—Models 612 and 804 Ingersoll-Rand impact wrenches, or equivalent; Station 3—¾-in. drive pneumatic wrench and main bearing wrench; Station 4—cylinder crab wrench, and Station 5—Model 804 Ingersoll-Rand impact wrench, or equivalent.

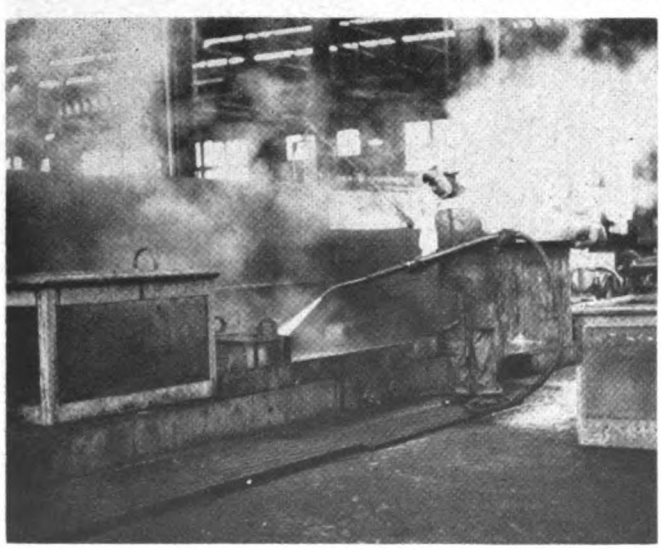
Work stations on the line have color codes. All equipment on each platform is painted a specific color. Even at an individual work station there are separate colors for two sides of the locomotive. These are:

- Station 2—Tan and pink.
- Station 3—Red and green.
- Station 4—Orange and blue.
- Station 5—White and brown.

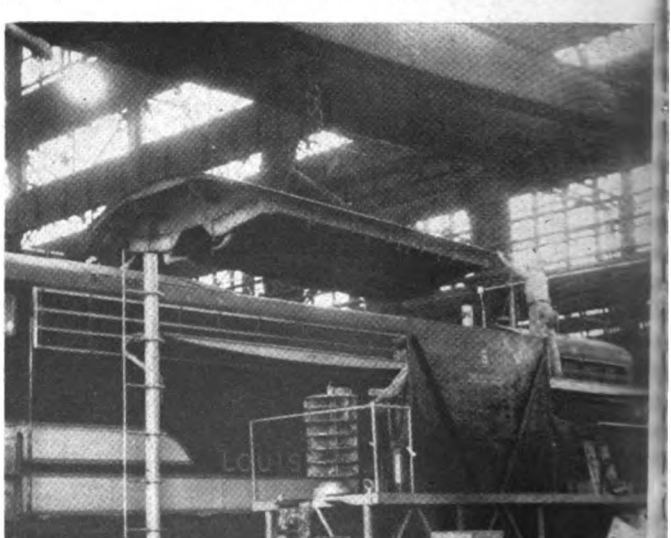
Cleaning has also received careful study. Three different cleaners are used in the cleaning vats. In Vat 1, a caustic soaking tank, Oakite No. 26 or equivalent is used for steel and iron parts. In Vat 2, which is pump circulated, Oakite No. 61A or equivalent is used for aluminum parts, such as Alco pistons. In Vat 3, an agitating type, Oakite No. 61A or equivalent is used for aluminum housings, shrouds, etc. In Vat 4, also an agitating type, Oakite No. 202 or equivalent is used for aluminum parts, such as crankcase covers and air boxes.



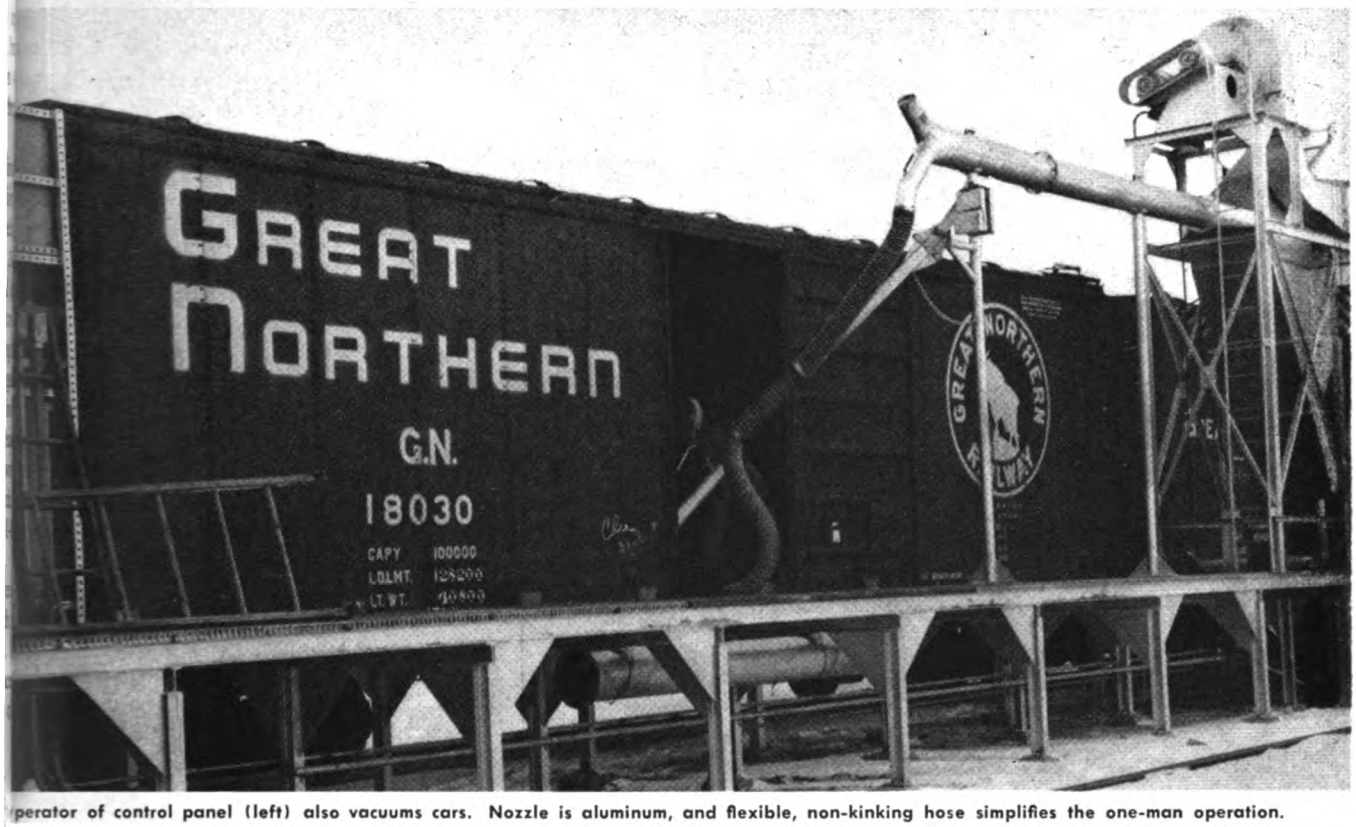
Quick-connect fittings are installed at frequent intervals in compressed air lines along the edges of the station so hoses for air-powered tools need not extend across platforms.



Cleaning vats contain a variety of special cleaning solutions for the various parts removed from locomotives and their diesel engines.



Hatch is lowered into position at Station 5. Overhead cranes play an important role in the handling of parts on entire line.



perator of control panel (left) also vacuums cars. Nozzle is aluminum, and flexible, non-kinking hose simplifies the one-man operation.

GN Installs Box-Car Cleaning System

Second mechanized facility is tailored to meet demand for cars to load grain, flour, and sugar

The Great Northern's new push-utton box-car cleaning system at rand Forks, N.D., is presently turn-ig out 70 to 90 clean, top-quality cars aily. With the $120,000 mechanized acility, the same number of employees ave quadrupled the output of clean ars. The three-station production ine combines the best features of the oad's initial cleaning system placed in peration over two years ago at Delta ard near Everett, Wash. (RL&C, an. 1960, p 17). At Delta, cars are repared for lumber shipments. A ushbutton interior car washer will be dded to the Grand Forks facility this pring to complete the installation. he sequence of operations then, as ow, will be continuous. The system, laced in operation last October 23, roduces a clean box car every five minutes and operates on one 8-hr shift, five days a week, with a five-man crew.

While at Delta the accumulated trash from the cars can be burned in butane-fired incinerators, an ordinance prohibits the burning of trash within the city limits of Grand Forks. Consequently, the new system includes a pulverizer in the production line that literally grinds up all refuse for trucking to a dump.

Grand Forks, headquarters for the GN's 1,700-mile Dakota division, is centered in the Red River valley. Major products originating on the division include beet pulp from East Grand Forks, Crookston, and Moorhead, Minn.; bagged flour from mills in Grand Forks and Fergus Falls, Minn., and malting barley, bagged sugar, durham wheat, flax, and oats which are loaded at various points. Potatoes are shipped in refrigerator cars, and the cars are cleaned by Western Fruit Express, a GN subsidiary. In the harvest season, the Dakota division loads an average of 300 to 400 box cars of grain per day. Normally, 100 to 150 cars are loaded daily in non-harvest season. These shipments account for approximately 30% of the grain loaded on the railroad. The Dakota division also originates 85% of the sugar, 20% flour, and 75% of the sugar beets.

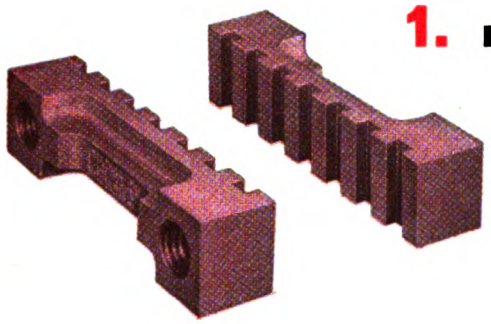
The need for top-quality box cars to move all this traffic is continuous. Heaviest demand is reached in mid-August and continues through the winter months. Grain cars for cleaning generally come from Duluth, but the majority of cars needed for other products come from GN gateways at St. Paul—Minneapolis and Sioux City.

The cleaning area is south of the car shop and includes two 1,750-ft stub-end tracks, with trash-disposal hopper, vacuum, pulverizer, and conveyor equipment midway of the area and between the two tracks. Work stations are so located that any combination of 40-ft or 50-ft box cars can be positioned with only one move. Under present operation of the cleaning system, a car remains at each of the three stations on an average of five minutes. First debris is removed from the car. The car floor is then vacuumed. At the final position, the car is inspected and

(Continued on page 26)

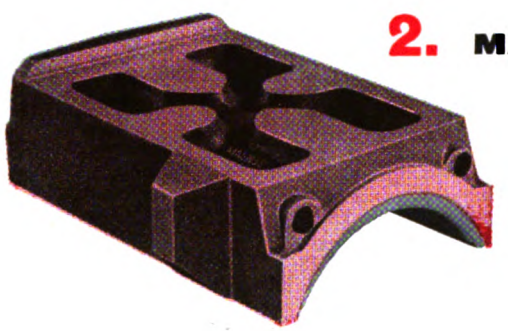
STABILIZED

Now MAGNUS offers you three low-cost ways to



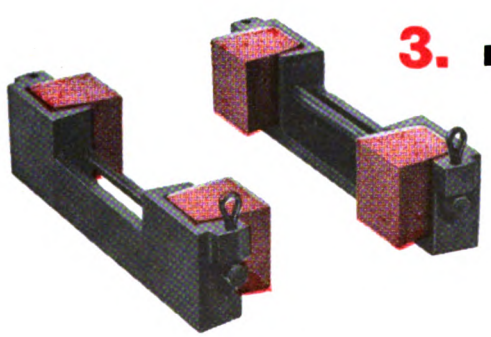
1. MAGNUS R-S JOURNAL STOPS

Provide maximum stabilization of the entire journal box assembly—increase miles per hot box ten times



2. MAGNUS FLAT-BACK SOLID BEARINGS

Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost



3. MAGSTOPS

Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

THE NEXT big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

JOURNALS—

...et BETTER BEARING PERFORMANCE

Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures —increase miles per hot box *ten times;* miles per cut journal, *fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

Journal Stops give the low-cost solid bearing a chance to work at optimum efficiency, not just part of the time, but *all* of the time! They can be easily installed on any freight car, new or old. And they increase new car costs less than 2%—*pay for themselves* in less than 3 years!

Wear on R-S Journal Stops is slight, and Stops can be re-shimmed should wear become excessive. The Stops should last the life of the side frame.

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust guard, tends to prevent spread linings in the bearings.

The flat-back bearing is also manufactured to "pre-war length," increasing resistance to impact and wear at both collar and fillet ends. Its greater mass and weight result in a more *rugged* bearing with inherently greater life expectancy.

Magnus flat-back bearings are interchangeable with any standard raised-back bearing, simply by using a flat-bottomed wedge. Bearing dimensions, in each size, are the maximum which can be easily installed in the journal box through the standard lid opening.

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The big advantage of the MAGSTOP is low-cost installation that can be accomplished quickly whenever side frames are removed for any reason. The bronze inserts provide ample bearing area and can easily be replaced, if required, without shopping the car.

By limiting journal movement within the box, MAGSTOPS greatly increase bearing life, protect against dust-guard damage, prevent loss and contamination of lubricant. They reduce wheel flange wear, too.

MAGNUS **METAL CORPORATION**

Subsidiary of **NATIONAL LEAD COMPANY**

BEARED TO PROGRESS
RPI
MEMBER



Cars are brought through system from storage tracks at far right. Entire cleaning installation is between two tracks. Conveyors move debris from cars to refuse containers.



Double-drum, reversing car puller moves cars through the entire cleaning process.

(Continued from page 23)

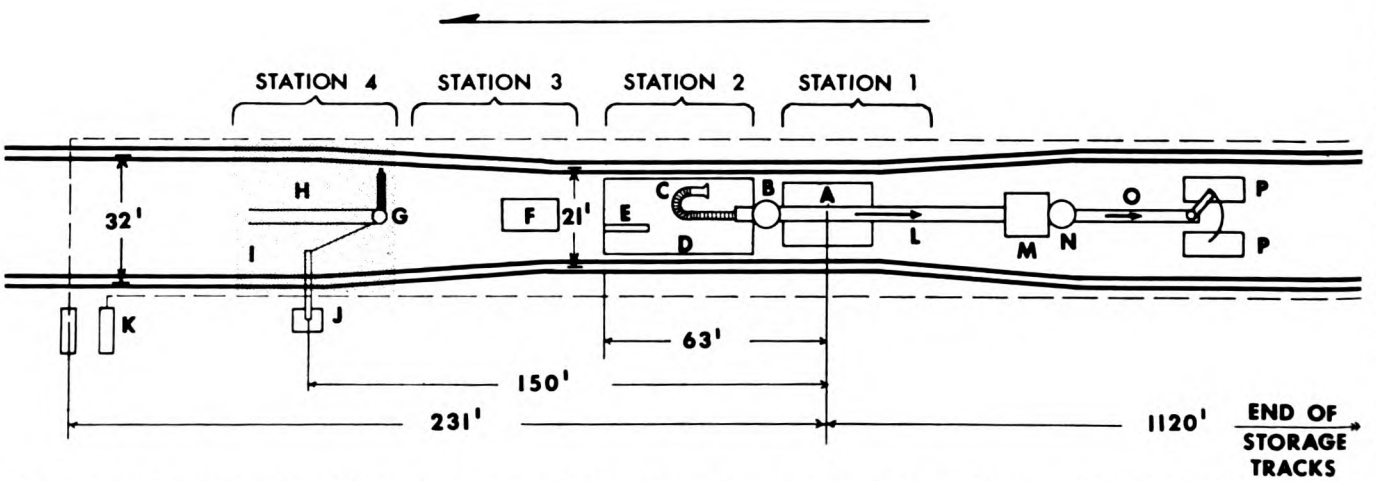
carded. One panel board controls all functions of the operation. Pushbuttons sound the warning signal, start and stop the vacuum cleaner, conveyors and pulverizer. A separate eight-button console on the panel board will control the washer when installed.

Carded in the yards for cleaning, cuts of 25 cars are moved by a switch engine past the cleaning installation to the east ends of each of the two tracks. Cars selected are those reasonably free of defects. A steel cable equipped with two pull hooks, parallels both tracks on the outside. The north track is generally worked first, although this may depend on where the car puller is located when operations begin. When the twenty-fifth car on the north track is pulled past the inspection station, the pull hook on the south track is then attached to the rear car of the cut to move it to the work area. Generally, the first 50 cars are finished, switched out, and replaced by 50 additional cars by noon.

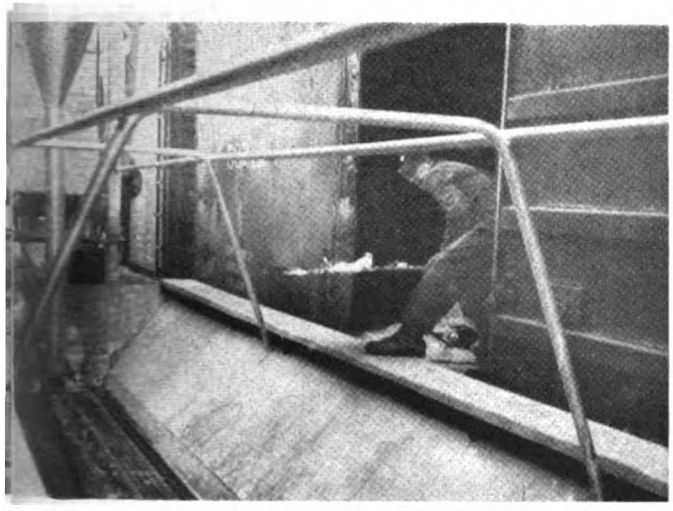
Here's how cleaning is done. The doorway of the first car of the 25-car cut is spotted by the cable hook opposite the 30-ft refuse hopper. Prior to reaching this station, a carman has prepared all cars by removing grain doors, loosening car lining so caked materials can be cleaned out, and driving in protuding nails. All loose material is placed in the hopper by two laborers. A third man assists in handling heavy materials and is responsible for other cleanup duties. A belt conveyor under the hopper carries refuse to the pulverizer.

After the debris is removed, the car is moved one car length to the Car-Vac vacuum cleaner. The control panel for the entire line is at this station. The platform at this station is at car-floor height and extends for 54-ft between the two tracks. The vacuum cleaner is powered by a 15-hp fan and motor capable of pulling a 6-in. water vacuum which draws air at 6,000 cfm through an 11-in. duct. The cleaner is equipped with a 6-in. reinforced flexible hose and a 12-in. nozzle. The hose is cantilever-mounted so one man can clean the entire floor without assistance. Material picked up by the vacuum goes through a dual-cyclone collector which removes the dust. Material is collected in a hopper above the belt conveyor. Weight of material in the hopper causes it to open, discharging its contents on the belt. The hopper can also be opened with a control on the cleaning nozzle.

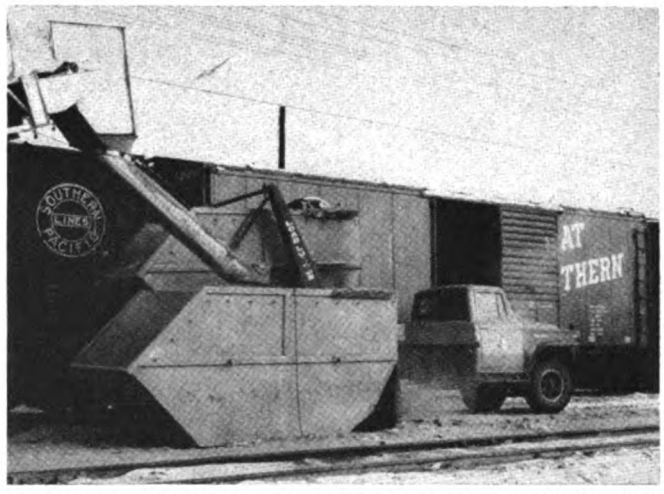
After the car is vacuumed, it is moved one car length to the inspection



Cars are cleaned on both tracks. Facilities, all designed to handle either 40-ft or 50-ft cars, include the following: A) 30-ft refuse hopper; B) Car-Vac and dust collector; C) Vacuum nozzle; D) 54-ft platform; E) Control panel; F) Plywood storage; G) Car washer; H) 42-ft track for washer; I) Paved drainage area with outer rails elevated 6 in.; J) Cantilever post for air, water, and electric lines to washer; K) Car puller; L) 131-ft belt conveyor, 30 in. wide; M) "Eat-Rite Hog" with 125-hp motor; N) Dust collector; O) 40-ft belt conveyor, 24 in. wide, with swivel chute at end; P) 12-cu ft refuse container.



Debris from box cars is thrown into refuse hopper at Station 1. Belt conveyor then transfers it to "Eat-Rite Hog" pulverizer.



Swivel nozzle at end of second conveyor places pulverized debris in pair of containers. Truck moves conveyors to dumping site.

station. Minor repairs, such as the patching of lining and floor, and application of brake shoes, are completed. The car is then carded for the highest possible commodity classification. After the 25 cars are completed, they are usually returned to the transportation yard. Cars requiring additional repairs are put on the regular repair track as each cut is pulled. Occasionally, extremely dirty and debris-laden cars that cannot be cleaned in the regular cycles are returned to the cleaning line.

The heart of the cleaning system is the conveyor arrangement which moves the debris to and through the pulverizer to the refuse containers. A 131-ft, 30-in. belt conveyor extends from the refuse hopper to the pulverizer. The belt is powered by a 7½-hp motor, travels at 100 ft/min and has a 21-ft lift. The pulverizer, manufactured by the Jacksonville Blow Pipe Co. and known as the "Eat-Rite Hog," has a 21- x 33½-in. opening leading to steel cutters mounted on a steel drum. As the drum spins inside a steel cylinder, the cutters mesh with heavy steel teeth around the edges of the cylinder. A 125-hp motor powers the unit. Grain doors, bundled paper, strapping, boards up to 12-ft long, and even track ties are sheared to bits and fall into the discharge hopper of the "Hog." The pulverizer reduces the conveyor load to about 50% of its original volume. A collector removes dust from this operation. To protect the cutting teeth in the pulverizer, 12-cu yd debris containers are placed at the outsides of the two cleaning tracks opposite the refuse hopper so that laborers can dispose of broken brick, tile, and concrete blocks removed from cars undergoing cleaning.

At the base of the hog discharge hopper, a 24-in. wide by 42-ft prebuilt troughed belt conveyor is inclined to give a 12-ft lift for moving refuse through a swivel-mounted discharge nozzle to two 12-cu yd containers. This conveyor can handle five tons of refuse per hour. It is powered by a 2-hp motor and travels 200 ft/min. Space is available for two additional containers when the cleaning operations are expanded to two or more shifts. The containers are lifted on a 24,000-lb capacity Load-Lugger truck by an hydraulically operated cradle. Refuse is then moved about four miles to a dump on GN property. The container system has been so successful that its use has been extended to the locomotive and car departments for disposal of scrap materials.

Track spacing in the cleaning area varies from 32 ft at the east end to accommodate the debris containers and truck, to 21 ft at the refuse hopper (Station 1) and then to 27 ft at the west end where the washing station will be installed. The entire area is illuminated with Westinghouse Luminaires. Platform and hopper also have incandescent floodlights.

The wheel-mounted car washer with telescoping boom will be installed on a 42-ft channel-section track which begins 61 ft from the west end of the platform. A single track cantilever signal structure will carry the 4-in. water line, air and electrical piping across to the washer.

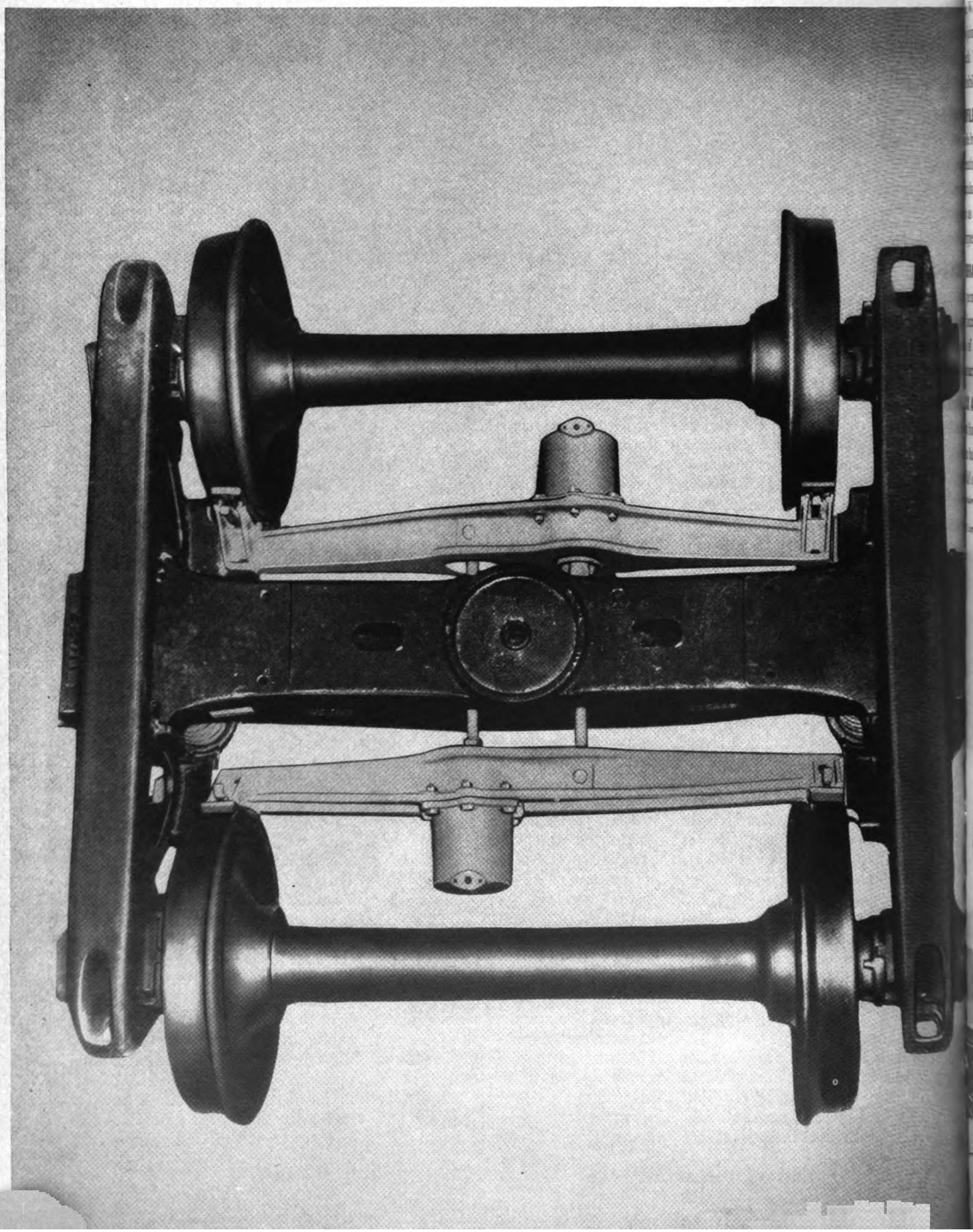
Because of the different lengths of cars being cleaned, the track layout is designed to provide space between the end of the platform and washing station equivalent to one car-length. This will permit simultaneous operations at all four stations, because the car washer can be spotted opposite the doorway of a car at Station 4. The boom, equipped with special nozzles, can be turned 180 deg to wash a car on the opposite cleaning track. A 30-hp booster pump provides 200 gal water/min at 200 psi pressure.

When the boom enters the car, water automatically comes on. When it retracts, the water shuts off. The nozzles oscillate 45 deg off the perpendicular. They are designed to provide a high pressure spray and at the same time flood the car sides and ends to wash all debris from behind the lining. The washing cycle will be adjustable from 1 to 10 min. A manual override provided at the console will continue washing time for extremely dirty cars. The outside rails of tracks at the washing area are elevated 6-in. for draining the cars. Area around the washer is blacktop.

The wash water is piped to a 33- x 48- x 6-ft 6-in. underground tank with the level controlled by a float valve. The water is then pumped to a two-part settling lagoon, each portion measuring 50 ft wide by 75 ft long. An 8-in. pipe with a 90-deg ell connects the two lagoons to provide maximum settling before the water enters the second lagoon. From this lagoon, the water drains to city sewers.

Link Belt equipment includes terminal and drive machinery, conveyor belts, cable line and steel work. The cable arrangement around the cleaning area is controlled by a double drum reversing car puller, rated at 20,000 lb starting pull or 10,000 lb running pull. The cable pulls 25 cars on two level tracks at 40 ft/min.

WABCOPAC® Simplified Brake U



sembles as truck component

que WABCOPAC Brake Unit, which consists of two es joined by push rods that pass through openings ruck bolster, offers car designers and builders lexibility with these important advantages:

OFILE—Lower profiles and greater car capacity ible by elimination of conventional brake rigging neath the car body. The WABCOPAC Brake Unit icular merit in the modern trend to specialized h as auto racks, containers, large tanks, piggy- oppers, etc.

OBRA* SHOES—COBRA Shoe's frictional charac- permit use of a single shoe brake and lower forces for the entire range of car weights. Com- of clasp brakes are eliminated from freight truction.

CK ADJUSTER REQUIRED—Piston rod travel is t for full wear of the shoes, and shoe forces are n balance. No inspection or adjustment required ull shoe life.

rademark of Railroad Friction Products Corporation

OTHER IMPORTANT FEATURES OF THE WABCOPAC BRAKE UNIT ARE:

- Assembles as a truck component—makes installation easier and less expensive.
- No additional levers, hangers or brackets are needed.
- Fewer pins—and hardened so they wear less.
- 2 WABCOPAC Brake Unit sizes—one fits 50-70 ton cars and the other fits 90-100 ton cars. (Empty and load brake arrangement available for both sizes.)
- Bolsters available with required openings.
- Identical braking forces on all wheels.
- Balanced forces on truck.
- Positive release.
- Less variation in rigging resistance.
- Lowers car weight.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PENNA.

0 similar tank cars built by General American Transporation Corp. and equipped with WABCOPAC Brake Units.



Fiftieth Annual Report . . .

ICC Finds Fewer Equipment Defects

Inspections of locomotives by ICC inspectors showed U.S. motive power to be in better condition in 1961 than in 1960. This is indicated in the annual report of the Director of Locomotive Inspection. "During the year 9.6% of the locomotives inspected by our inspectors were found with defects or errors in inspection that should have been corrected before the locomotives were put into use," J. A. Hall, the director, commented in his annual report to the Interstate Commerce Commission.

In 1960, inspectors had found 10.2% of the units with some ICC defect and had ordered 531 out of service. In 1961, 504 units were ordered from service.

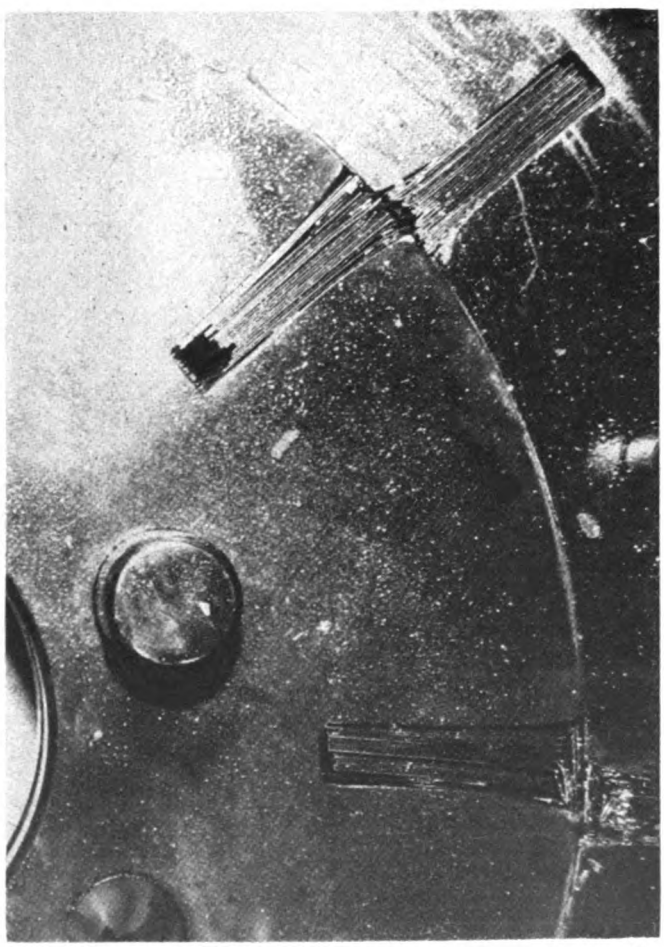
While in 1961 there was a continued decline in the number of injuries resulting from accidents due to defects on locomotives, the report noted that the number of accidents had risen. "Seventy-one accidents occurred in connection with all types of locomotives in which 77 persons were injured," it was stated. "Compared with the preceding year, there was an increase of 21 accidents and a decrease of 4 injuries." For the fifth year, there were no fatalities resulting from accidents caused by locomotive defects.

Defective Locomotives and M-U Cars Found by ICC Inspectors

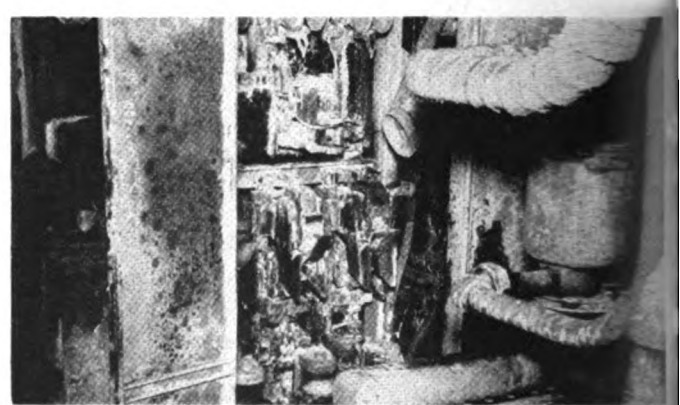
	Locomotives	
	1960	1961
Units reported	32,186	32,074
Units inspected	105,702	95,689
Units defective	10,638	9,000
Total defects	31,427	26,614
Per cent defective	10.1	9.4
Ordered from service	517	469
	M-U Cars	
Units reported	2,671	2,633
Units inspected	2,571	2,400
Units defective	450	372
Total defects	1,254	1,605
Per cent defective	17.5	15.5
Ordered from service	11	31

This is the 50th annual report issued in compliance with Locomotive Inspection Law which was originally approved on February 17, 1911, as the Boiler Inspection law following two years' consideration in Congress. During the 50 years the group has had only six directors: J. F. Ensign (1911-1913); F. McManamy (1913-1918); A. G. Pack (1918-1935); J. M. Hall (1935-1948); E. H. Davidson (1948-1952); C. H. Grossman (1952-1953); J. A. Hall (1954-date).

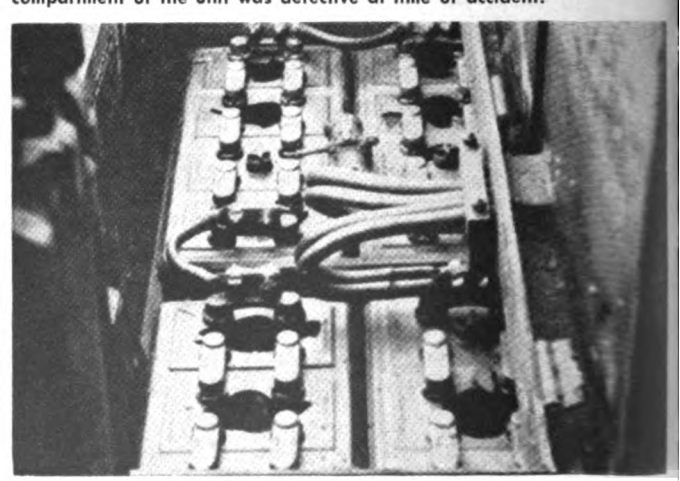
When it became effective on July 1, 1911, the Boiler Inspection law covered 63,000 steam locomotives, applying only to the boilers and their appurtenances. In 1915, the scope of



Broken spring packs in harmonic balancer removed from a diesel engine after a crankcase explosion resulting from overheated main bearings. Seven crankcase and air-box explosions resulted in employee injuries.



ICC report indicated fire damaged the electrical control cabinet of a diesel-electric locomotive. The portable fire extinguisher in the control compartment of the unit was defective at time of accident.



Battery of a diesel-electric locomotive was damaged when the accumulated gas in the battery containers ignited. Twelve accidents involving electrical equipment resulted in injuries during fiscal year 1961.

:C jurisdiction was expanded to in-ıde "the entire locomotive and ten-r and all parts and appurtenances." 1926 the scope of the Locomotive spection Act was again expanded, is time to cover locomotives other an steam. In 1956, multiple-unit rs were brought under ICC jurisdic-ɔn.

"There was a decrease in the num-r of locomotives for which carriers ere filing reports on June 30, 1961, compared to the number being filed ı June 30, 1960," Director John A. all reported. "The decrease resulted ɔm 421 steam locomotives being re-ed during the year and a decrease of :0 in the number of other-than-steam d multiple-operated electric loco-ɔtive units." During fiscal 1961, ded June 30, reports were filed for ;,074 units. Inspectors conducted ;,332 inspections, down from 108,-:9 conducted in fiscal 1960.

Locomotive defects most frequently tected by ICC inspectors in 1961 volved internal combustion engines ıd their appurtenances, brake equip-ent, sanders, and fuel systems. Additional details are given in the table. The Director annually points out that "if the reported defective parts . . . are considered, those which may be expected to require most maintenance will be indicated, and inspection and repair programs may be set up accordingly."

Of the 71 accidents resulting in injuries, 17 were caused by condition of floors, steps, and passageways of diesel-electric locomotives. Fourteen, the Director noted, were caused by accumulations of oil on the walking surfaces—an increase of seven compared with the previous year. Twelve accidents resulted from failures in electrical equipment, seven from crankcase and air-box explosions, and seven from cab-seat failures.

Most Common Defects on Diesel and Electric Locomotives

Partial list of parts defective, inoperative, or missing, or in violation of ICC rules found during inspection of 105,702 in 1960 and 95,689 in 1961.

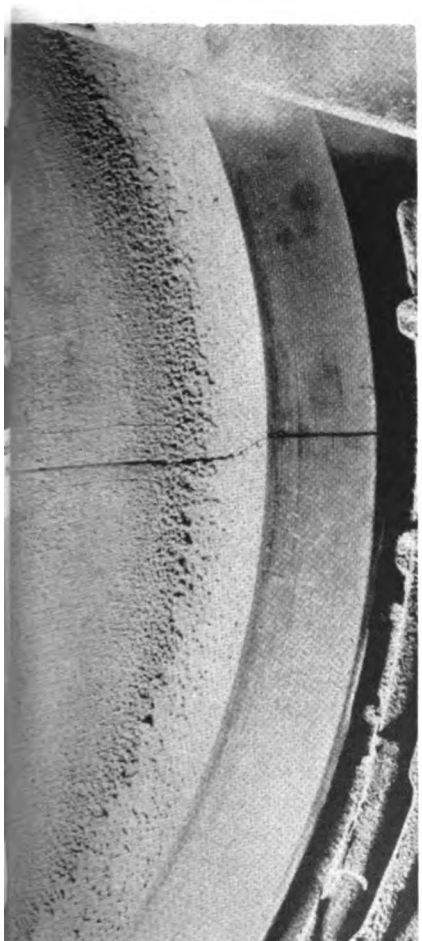
	1960	1961
Brake equipment	3,617	3,066
Cabs and cab windows	1,407	840
Cab floors, aprons, and deck plates	2,461	2,235
Controllers, relays, circuit breakers, magnet valves and switch groups	704	565
Draft gear	420	402
Fuel system	2,702	2,193
Inspections and tests not made as required	1,063	847
Internal-combustion engine defects, parts and appurtenances	7,184	6,124
Jumpers and cable connectors	350	434
Motors and generators	821	759
Sanders	3,602	3,131
Springs and spring rigging, driving and truck	512	415
Trucks	765	692
Wheels	798	805
Miscellaneous	1,400	1,210

Safety Appliances

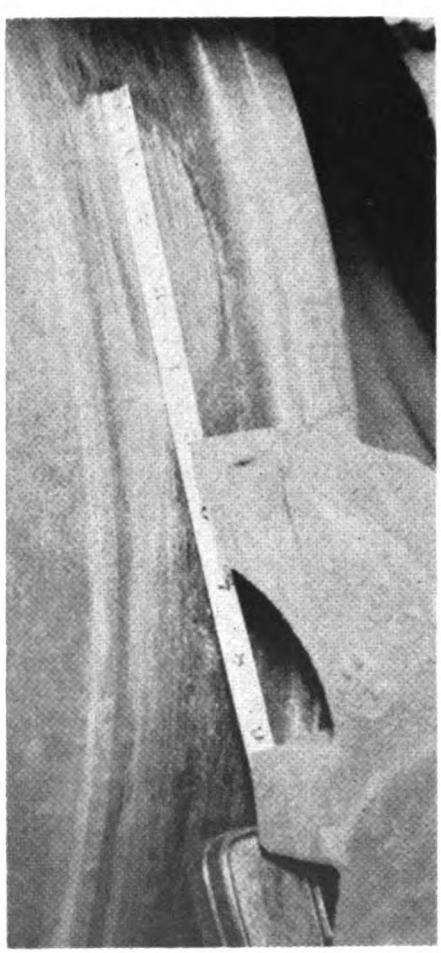
The ICC Bureau of Safety and Service conducts inspections under the Safety Appliance Order of 1911 and the Train Brake Law of 1958. Inspections by inspectors of this Bureau indicate little change in the condition of safety appliances on cars and locomotives according to the annual report. Agents of the Section of Railroad Safety found 5.11% of 1,524,-056 freight cars with safety appliance defects last year as compared with 5.40% of 1,579,463 in 1960; 1.03% of the 11,516 locomotives had defects in 1961, a figure which was down from 1.04% in 1960.

Air-brake tests were observed on 5,103 freight trains—320,391 cars—by inspectors during the past fiscal year. Proper tests were observed on 4,299 of these trains (84.2%), and improper tests on 804. Proper tests were observed on 97.1% of the passenger trains. Inspectors also checked air-brake shop practices 1,784 different times and rated 89.5% of these as proper. Concerning the details of air-brake defects detected during its inspections, the Section on Railroad Safety reported the following about the cars and locomotives which were checked:

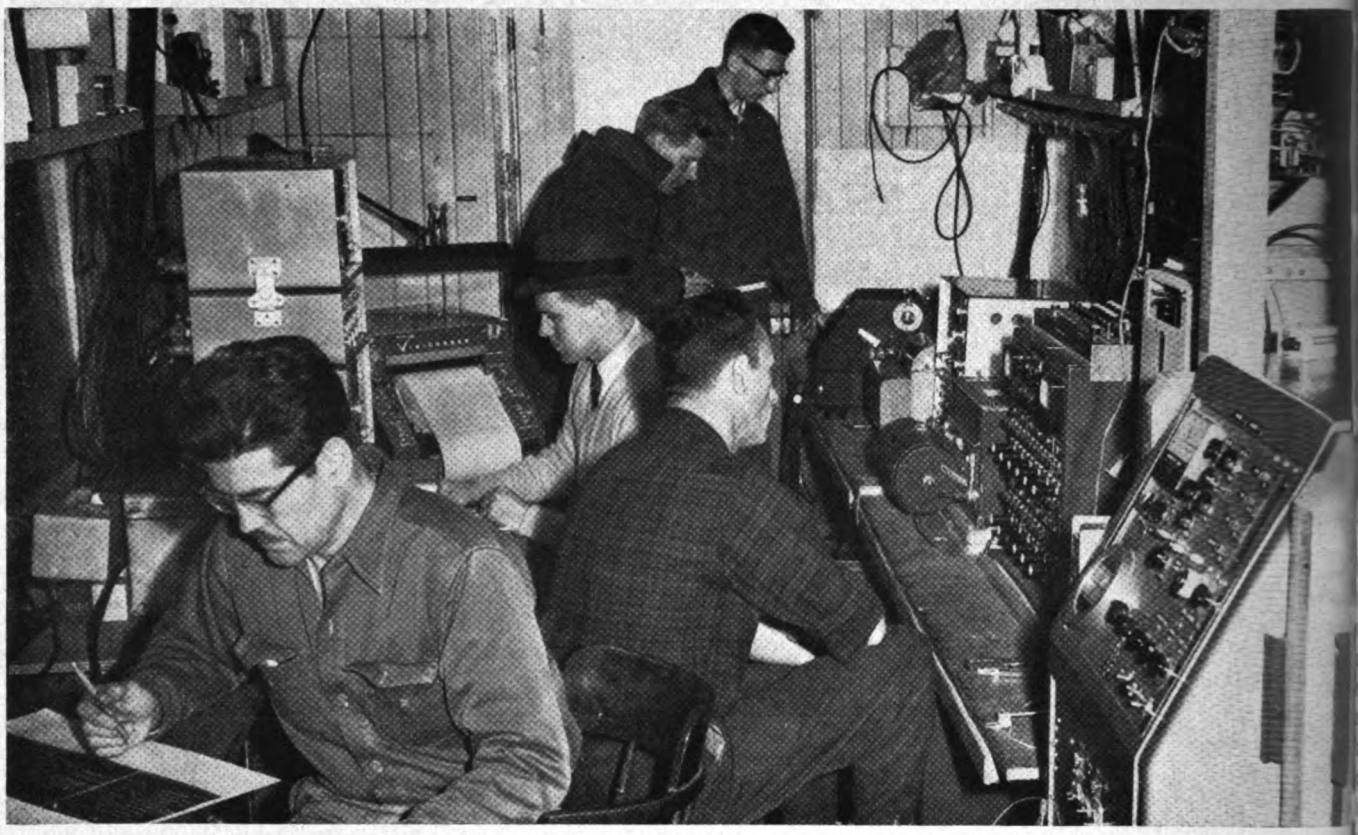
	1960	1961
Trains observed	4,595	6,139
Total cars	243,512	332,793
Air brakes cut out or inoperative	2,380	2,371
Air brakes not cleaned in required period	11,373	10,590
Excessive piston travel	6,397	6,890
Total defects	20,150	19,851



racked wheel was removed from a diesel-ectric locomotive after unit was ordered out of ırvice by an inspector who discovered defect.

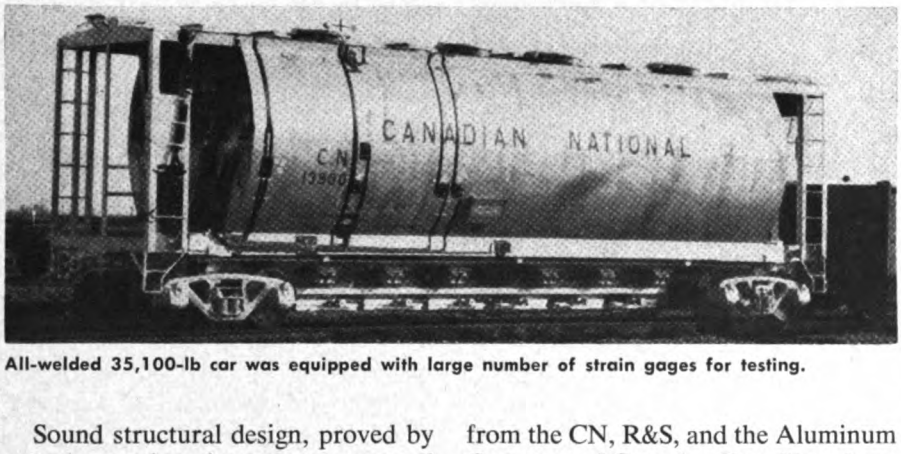


Slid flat spot 4½ in. long on the wheel of a diesel-electric locomotive was found by ICC inspector who then ordered unit out of service.



Electronic recording instruments were installed in caboose which accompanied hopper car during road and impact tests.

CN Approves Tubular Hopper Design



All-welded 35,100-lb car was equipped with large number of strain gages for testing.

Sound structural design, proved by complete testing of a prototype car and good customer acceptance shown by extended revenue service with four of these cars, led to an order for ten additional type aluminum covered hopper cars which were scheduled for delivery to the Canadian National last month.

In September 1960, America's first tank type hopper cars—two for the Canadian National and two for the Roberval & Saguenay—were completed (RL&C, Oct. 1960, p. 42). These aluminum cars were the work of a design team comprised of engineers from the CN, R&S, and the Aluminum Company of Canada. To utilize aluminum to its best advantage, it was agreed to develop a 3,000-cu ft design incorporating the following features:

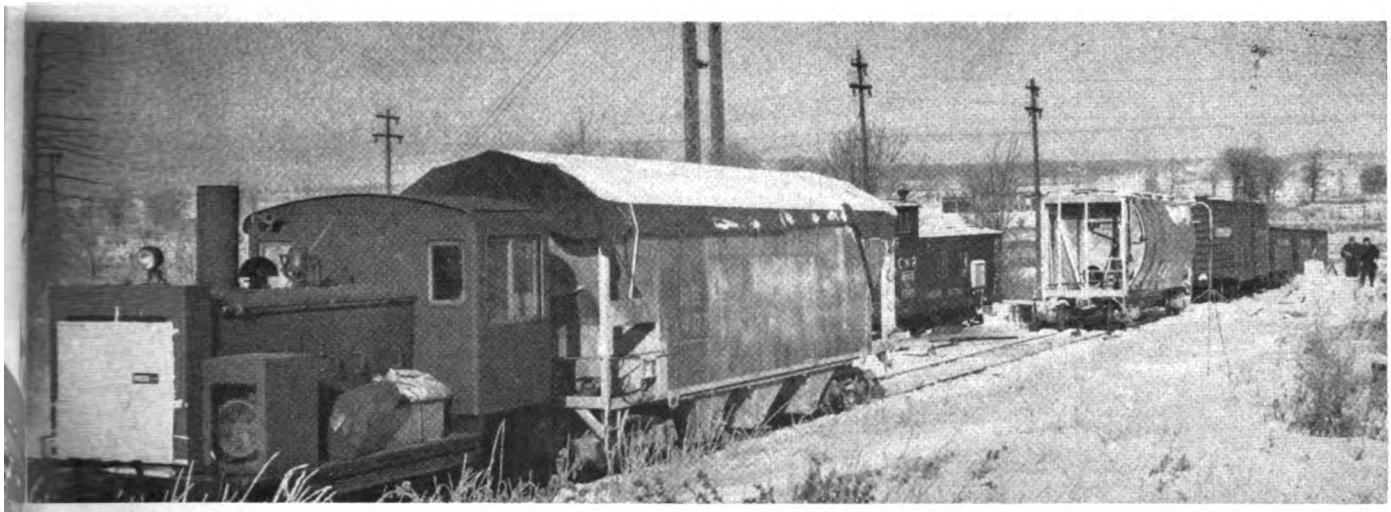
- Curved side sheets sloping toward a central discharge opening;
- Elimination of center sill between the bolsters;
- Elimination of posts for side sheet stiffening.

It was anticipated that such a design would result in a considerable reduction in tare weight and in fabrication costs. The car, when built, had a light weight of 35,100 lb, a reduction of 17,000 to 19,000 lb as compared to a standard 3,000 cu ft steel covered hopper car.

The new design has been found to be easier to unload and clean. The concave sides and the elimination of the center sill permit rapid and unobstructed discharge through the central discharge gates.

Since the design was so radical from usual railway practices, it was decided early in the development that one car should be submitted to a series of mechanical tests, including static, impact, road and fatigue tests. The remaining three cars were to be placed at the disposal of the shippers to determine their acceptability under service conditions. The mechanical tests covered a period of about nine months, and during this time the three other cars were receiving favorable service reports from railway customers.

Impact tests on other hopper cars had indicated the possibility of eliminating the center sill between bolsters because only 50% of the coupler impact force remained in the sill beyond



Open-top hopper with gross weight of 210,000 lb was impacted against test car on grade to develop coupling forces up to 1,000,000 lb.

the bolster. In the standard design car having straight sides, however, it was found that the material saving achieved by removal of the center sill was offset by the heavy transverse member required to transfer the force from the stub sills to the sides of the car. By curving the sides downward toward a central discharge outlet, the span of this transverse member was reduced by 40%, resulting in a corresponding weight saving.

The aluminum alloys used for these cars were Alcan D54S (AA-5083) for sheet and plate, and Alcan 65S (AA6061) for extruded sections. The cars were of all-welded construction, using Alcan 56S (AA-5056) filler wire alloy. Machine welding was employed wherever possible to insure high quality welds and to speed car construction.

The two CN cars were equipped with Barber stabilized trucks, cast-steel wheels, Westinghouse AB-1B empty-and-load brakes, and Keystone steel gates. The R&S cars differed only in that they had Keystone aluminum gates and 5-in. diameter pneumatic discharge outlets at each hopper on each side of the car. Shaker brackets were attached to slope sheets on one side of the car.

Test Program

The test car, CN 139000, was fitted with approximately 180 electrical resistance SR-4 strain gages at some 60 locations by the test crew, personnel from both the CN and Alcan. The test program was a joint project.

First phase of the program was the static test in which static strains and side-sill deflections were determined for a loading of medium density sand (98.2 lb per cu ft) to approximately full-weight capacity, then with a full weight and cubic capacity of alumina (60 lb per cu ft), and finally a 20% overload with cryolite (80 lb per cu ft). Most of the static stresses for all loading conditions were less than 3,000 psi, with the exception of the stresses on the flat hopper sheet at the ends where the side sheet meets the shear plates. The combined bending and diaphragm stress reached 20,000 psi on first loading and, when unloaded, recorded a residual stress of 5,000 psi, which indicated a permanent set. The deflections on the side sill never exceeded ⅛ in., even under the 20% overload condition. It was apparent from the test results that most of the recorded stresses were below design expectations.

After the static test, the car was moved to the Aluminum Laboratories, Limited, Kingston, Ont., where the impact tests were carried out to determine the stress levels in the car, experienced under simulated coupling and humping conditions. The test car was fully loaded with alumina to 202,000 lb on the rail, while the strike car, RS 1407, an all-aluminum triple hopper car, was loaded with bauxite to 210,200 lb on the rail. There were 43 impacts during the course of the test, with the maximum impact speed of 8.7 mph resulting in a load on the dynamometer block of 1,004,000 lb. The dynamometer block replaced the coupler on the test car, while a strike block of high-tensile steel replaced the coupler in the strike car. At one stage of the test program, 41 gages were being read simultaneously on four oscillographs.

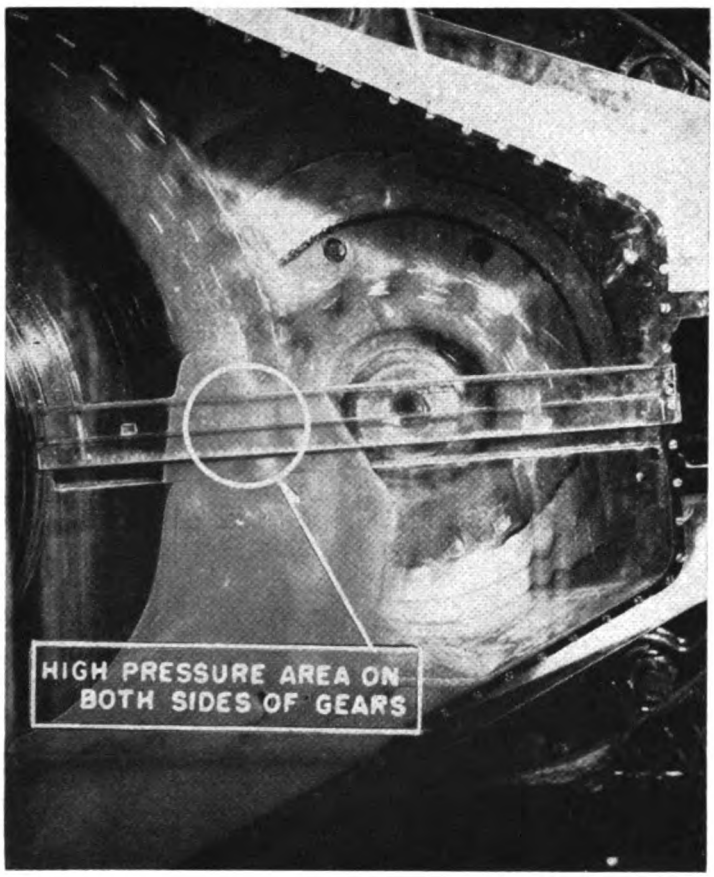
Following the impact tests, the car was put through a series of road tests between Montreal and Toronto, and between Montreal and Arvida, Quebec, to record the dynamic loads produced by track reactions at speeds up to 70 mph. The strains were recorded on an 8-channel Heiland Visicorder and a four-channel tape recorder. The random strains recorded were analyzed to determine the frequency with which various strain levels were exceeded. The interpretation of the results indicated that the road stresses were not of a high enough level to cause any possibility of fatigue failures at these locations.

Fatigue Test

The final phase of the program was a fatigue test, with strains induced on the car by a 5-ton Losenhausen pulsating jack. The load in the car and the amplitude of the jack were set to obtain the required strain on a control gage, based on data obtained from the earlier road tests. Some gages were stressed higher than in the road tests, while others were somewhat lower. The car was tested to 10 million cycles which, based on service data for a covered hopper, is the equivalent to approximately 25 years of road life. While no damage occurred to the aluminum car structure, 28 truck springs were broken during the running of the test.

According to E. T. Hurley, chief of technical reasearch for the CN, the car passed all tests very satisfactorily, and the design has been fully approved by the Canadian National. During the past year, tubular covered hoppers have been built in the United States by ACF Industries, Greenville Steel Car Company, and the Union Tank Car Company.

Reducing the Consumption of Traction Gear Lubricants



Pumping action of gear and pinion forces lubricant into labyrinth seal opening of old-type case. It then drains onto the roadbed.

Traction gear cases which have operated for a year without requiring additional lubricants are the product of an Electro-Motive development program intended to reduce maintenance on new and replacement locomotives. Not only is the new gear case reported to retain grease for longer periods, it can also absorb an overcharge without throwing the excess grease out through the axle seals. The manufacture of all previous model gear cases has been discontinued by EMD. Incorporated in the new case are these modifications:

- Return duct on the side to eliminate drain slot leakage;
- Wider gutters to protect seals;
- Modification of the axle gear.

A monthly inspection is recommended to spot any dilution of grease with axle cap oil or water. A proper interval for addition of lubricant can also be established. Lubricant for the new type gear case is a high-viscosity, soap-thickened oil instead of the asphaltic-base greases previously used. It has been found that the greases become very stiff and lose their lubricating qualities when worked over a period of time. Field tests showed some grease solidification occurred within three weeks.

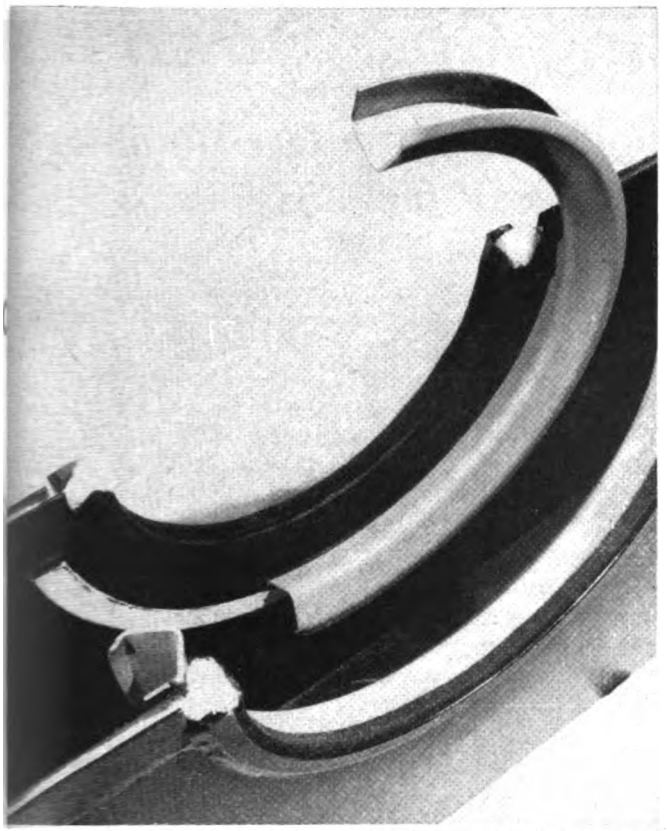
Approximately 90% of the grease lost to the roadbed from the conventional case comes through the drain slot at the pinion end of the traction motor armature shaft. Ten per cent leaks from the axle seals or through poor fitting filler caps. In an EMD traction motor assembly, the pitch line of the gear and pinion has about the same diameter as the labyrinth (nonrubbing) seal between the armature shaft and the stator frame. Rotation of the gears squirts the lubricant from the meshing teeth into the labyrinth seal opening. This opening, connected to the pinion-end drain slot, is open to the atmosphere.

New Design

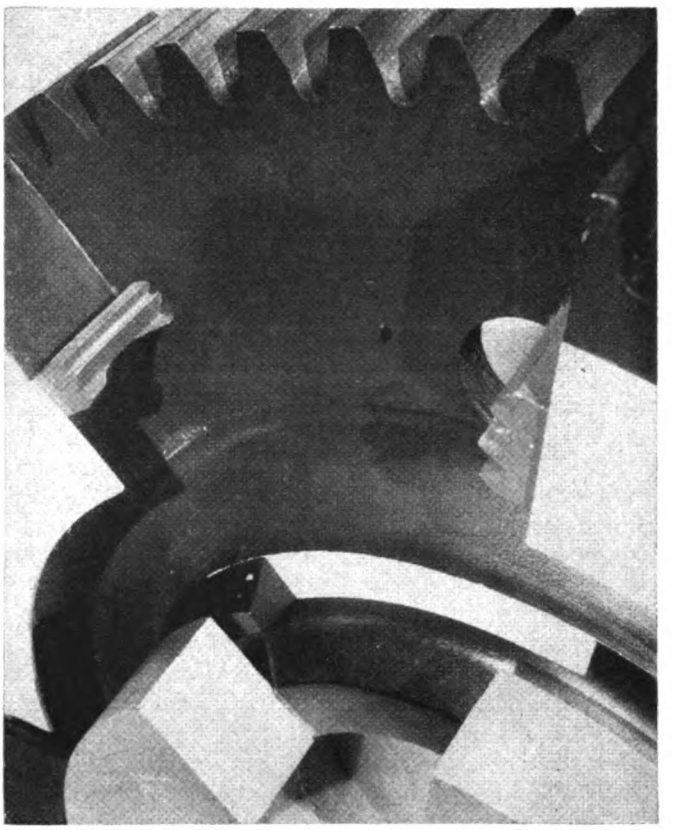
In the new design, a return duct is applied to the side of the gear case below the drain slot. Thrown grease is rerouted back to the gear case. A neoprene gasket between the grease duct and the traction motor cover prevents grease loss and keeps dirt and water out of the gear case. Tests of the modification show that the gear cases can operate about four times longer without adding grease.

In changing the flow of grease from the drain slot, it has been necessary to protect the axle seals from overcharged gear cases. A good rubbing seal between the gear case and axle is difficult to obtain because of the clearances between the axle and traction motor support bearings. A radial movement of the axle of 0.022 in. with new bearings and as much as 0.062 in. with worn bearings produced eccentric axle motion, matting the felt sealing surfaces so they would not rub after only a short time in service. Any grease around the seal passed under the felt and out of the gear case.

To maintain the interchangeability of gear cases, the drip channels, or gutters, have been made wider so the lubricant can more readily drain around and away from the axle seals. The gutter must be removable because welding of the wider gutter to the gear case would restrict assembly of the case over the axle gear. Channels are welded to the inside of the case so that a 1½-in. gutter can be rotated into position. Retainer blocks welded to the lower half of the case prevent the gutters from rolling out of the channels in service. Gutters are designed to drop out upon removal of the upper half of the gear case. No special disassembly operations are required in removing the case.



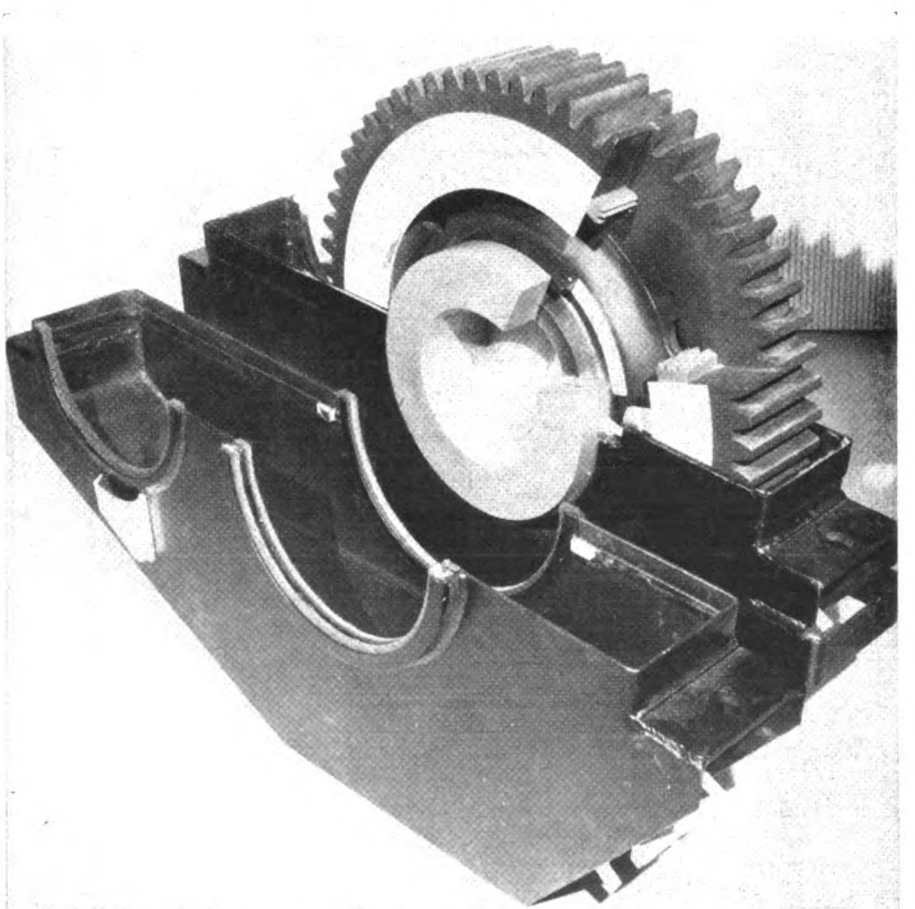
Removable gutters are positioned in channels welded to the insides of the gear cases. Removable feature is necessary to make assembly possible. Parting line gasket seals two halves of the gear case.



Side plates are welded to both sides of the axle gear as shown in this cutaway view. Reservoirs formed by these plates retain grease so that amount accumulated in bottom of the case is reduced.

Reservoirs formed by adding washer-shaped discs to both sides of the rim of the axle gear can absorb an overcharge of lubricant. Lubricant on the gutters now drains into these reservoirs. Centrifugal force developed by the rotating gear holds the lubricant around the gear rim, reducing the amount in the bottom of the gear case after only a short time of operation. When the traction motor stops, lubricant falls from the gear reservoir back into the gear case. Only a small quantity at the bottom of the gear is restricted by the side plate so it cannot drain back into the case. Excess lubricant thrown from the gear teeth eventually will be stored in the reservoir which can hold 8 to 20 lb of lubricant, depending on the gear ratio.

Excess metal around the wheel side of the gear hub, outside the stress relief area, has been removed to prevent a lubricant build-up at the wheel seat. This is caused by splash from below and by lubricant draining from the center of the gear which cannot be eliminated, even by the larger gutters. A gasket has also been applied to the parting line of the gear case to prevent leakage at that point. All of these design changes have produced a case which requires much less servicing.



New gear case design retains grease longer so that relubrication intervals can be extended. Return ducts can be applied to existing cases so that their lubricant loss is also reduced. Locating fixture is available for this conversion.

Solid-Bearing Operating Cost Down

Study indicates that today's cost is less than half that calculated during an AAR investigation in 1955

Since 1954 several changes have been made in the standard solid bearing journal box assembly that have improved its performance. Outstanding among these was the AAR action requiring that lubricating devices replace waste packing, a program due for completion shortly.

What do these changes mean to the railroads in dollars and cents? From a study* just published by the Magnus Metal Corporation comes this answer: Compared with 1954 costs, currently an average annual savings of $41.29 per lubricator-equipped car over a 1954 waste-packed journal box car ($40.86 vs. $82.15).

Comparison is made with 1954 because the AAR Research Center, at the request of the AAR Board of Directors, at that time made a study entitled "Comparative Economics of Journal Bearings." The study was published in November 1955 as Report No. 20000. The AAR report, covering the economic aspects of freight car journal roller bearings in comparison with plain (solid) bearings, used 1954 operating statistics and 1955 costs in compiling solid bearing costs.

Updating only that part of AAR Report No. 20000 dealing with solid bearings, the Magnus study is based on AAR hot-box performance reports covering the first seven months of 1961. During this period an average of 71.1% of all cars operated with lubricating devices. The calculations in the Magnus study follow the pattern of Report 20000 but reflect the current operating situation and current costs.

The Magnus study developed two sets of data as shown in the accompanying table. Using calculations based on hot-box reports for the seven months, it projects the costs to cover the entire year 1961. Then, it projects the costs to cover one year starting May 1, 1962, when it is assumed that all cars will be equipped with lubricating devices. This assumption is made because the 1962 AAR Code of Interchange Rules specifies that on and after that date all cars in interchange with solid bearings must be equipped with lubricating devices.

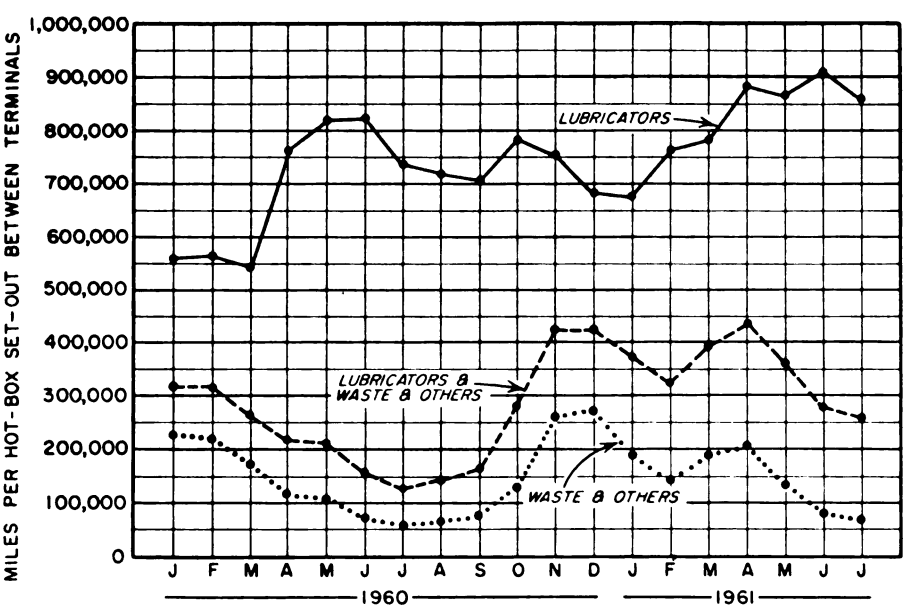
In the 38-page report Magnus has included detailed cost tabulations and listed the sources of data and projections used in the calculations.

The report contends that lubricating devices have been responsible for a substantial reduction in hot boxes. In the first seven months of 1961 the AAR reports show 50,509 hot boxes, or 68.3% of the 73,967 hot boxes (assumed to be all in waste-packed boxes) in the equivalent 1954 period. Only 15,349 or 30.4% of the 50,509 hot boxes were reported for the 71.1% of all cars equipped with lubricating devices.

On the basis of the performance of these lubricator-equipped cars Magnus makes the projection for the year starting May 1, 1962, of a total of 37,750 hot boxes.

The current average life of a solid bearing is set at 4.8125 years as compared to 3.36875 years used in the 1955 AAR report. This increased service life was arrived at by Magnus after a study of solid bearings sales to 51 large railroads owning 905, 617 cars. It anticipated lubricator renovation at the first repack period, scrapping at the second. For the 1961 calculations, a four-year life expectancy was used, based on the Rule 66 24-month repack period. For the year starting May 1, 1962, a five-year lubricator life has been used because Rule 66 has just been changed, extending the repack period to 30 months.

* "Current Economics of Solid Bearing Performance" published January 15, 1962 by Magnus Metal Corporation, subsidiary of National Lead Company.



Performance of lubricators has been consistently better than that of loose waste. During first seven months of 1961 when 71.7% of all cars were equipped with lubricators, only 30.4% of all hot-box setouts occurred on the lubricator equipped cars, according to AAR statistics.

Less Servicing

By surveys Magnus has determined 500 miles to be the average distance between terminal inspections and average inspection time to be 3.16 min per car. ARA Report used 125 miles and 4.51 min, respectively, for these items. Magnus also determined journal box oil consumption with lubricators to average 40 oz per car set per 1,000 car-miles.

In its conclusions reached as a result of its study Magnus used $52.71 as the added annual capital costs of owning a car with roller bearings. This figure was calculated as follows: AAR Report 20000 set annual cost of ownership of roller bearings at 7.53% which included 2.5% interest, 2.4% taxes, 0.1% insurance and 2.53% de-

Item	Description	A.A.R. Report 20000, Figure D 1954 Operating Statistics - 1955 Costs			1st 7 months 1961 Operating Statistics - August 1961 Costs					
					1961 Projected Cost 71.1% Cars Lubricator Equipped			12 months Starting May 1, 1962 - All Cars Equipped with Lubricators		
		Total Annual Cost	Annual Cost Per Car *	Cost per 1,000 Car Miles	Total Annual Cost	Annual Cost Per Car **	Cost Per 1,000 Car Miles	Total Annual Cost	Annual Cost Per Car **	Cost Per 1,000 Car Miles
1.	Repairing Hot Box Set Outs	$ 17,851,234.72	$ 9.05	$0.558	$ 16,774,280.18	$ 8.25	$0.535	$ 7,197,161.36	$3.55	$0.230
2.	Damage to Equipment - Overheated Journals Broken	3,966,250.00	2.01	0.124	10,481,598.14	5.16	0.334	3,071,108.25	1.51	0.098
3.	Fires Due to Hot Boxes	577,167.00	0.29	0.018	688,549.40	0.34	0.022	295,092.60	0.15	0.009
4.	Cut Journals Found During Routine Inspection & Periodical Repacking	2,665,583.32	1.35	0.083	2,359,309.52	1.16	0.075	1,012,157.38	0.50	0.032
5.	Defective Bearings Found During Routine Inspection other than Wheel Renewal & Periodical Repacking	5,913,560.29	2.99	0.185	4,644,925.30	2.28	0.148	4,644,925.30	2.28	0.148
6.	Periodical Lubrication per A.A.R. Interchange Rule 66	21,887,793.85	11.10	0.685	37,224,743.79	18.31	1.188	28,894,073.67	14.22	0.922
7.	LABOR - Not included in Items Above									
A.	Routine Transportation Yard Inspections & Service Attention	80,490,194.87	40.82	2.519	15,631,811.90	7.68	0.498	15,631,811.90	7.68	0.498
B.	Cleaning & Repacking Journal Boxes - Wheel Defect Removals	396,328.50	0.20	0.012	662,825.25	0.33	0.021	662,825.25	0.33	0.021
C.	Applying Spring Packing Retainers	170,337.20	0.08	0.005	-	-	-	-	-	-
8.	MATERIAL - Not included in Items Above									
A.	Defective Bearing Replacements	9,555,880.80	4.84	0.299	6,528,765.75	3.21	0.208	6,528,765.75	3.21	0.208
B.	New Axles (Replacements)	6,612,481.77	3.35	0.207	9,245,852.83	4.55	0.295	9,245,852.83	4.55	0.295
C.	Journal Box Oils	5,667,195.14	2.87	0.177	3,061,107.20	1.50	0.098	3,061,107.20	1.50	0.098
D.	Prepared Packing or Lubricating Devices	3,412,333.65	1.73	0.106	337,436.68	0.17	0.011	100,465.55	0.05	0.003
E.	Journal Box Lids	1,279,237.98	0.64	0.040	1,687,183.95	0.83	0.054	1,687,183.95	0.83	0.054
F.	Spring Packing Retainers	902,770.99	0.46	0.028	-	-	-	-	-	-
G.	Journal Bearing Wedges	584,114.76	0.29	0.018	834,778.00	0.41	0.027	834,778.00	0.41	0.027
H.	Journal Box Dust Guards	154,476.02	0.08	0.005	184,658.76	0.09	0.006	184,658.76	0.09	0.006
	Grand Totals	$162,103,951.86	$82.15	$5.069	$110,349,886.65	$54.27	$3.520	$83,051,967.75	$40.86	$2.649

Annual labor and material maintenance costs have been arranged in the same way as was done in the original AAR study. Note referring to annual cost per car in the 1955 study* is cost based on 31,944,356,429 total freight car mileage for year 1954 as shown in AAR Annual Hot Box Statistics and an average of 16,200 miles per year per car for freight cars. Corresponding note in Magnus study is based on 31,341,874,038 freight car mileage in 1960 and an average of 15,420 miles per car per year.**

depreciation. From three leading car builders Magnus got quotations for the difference between the cost of a new car equipped with solid bearings and one equipped with roller bearings (5½ in. by 10 in.). Added cost of roller bearings was quoted as $750—$700 and $675. Using the $700 added cost figure and applying the 7.53% to this amount Magnus arrived at the annual $52.71 cost of owning a set of roller bearings.

In the report Magnus reached the following conclusions as the result of its study:

- "Currently the average cost of owning and operating solid bearings with lubricating devices is $40.86 per car per year—less than half the cost as determined by the Association of American Railroads for the year 1954 for solid bearings with loose-waste packing.
- "Freight cars equipped with solid bearings and lubricating devices are now operating with an average of one hot box set-out per 54.05 car-years as compared with 15.29 car-years in 1954. After all freight cars with solid bearings are equipped with lubricating devices (as required by A.A.R. Interchange Rules on and after May 1, 1962), it can be anticipated this performance will be attained by all cars equipped with solid bearings thereafter.

The entire annual cost of owning and operating a solid bearing car with lubricating devices in freight service averages $11.85 less than the annual cost of merely owning a car set of roller bearings.

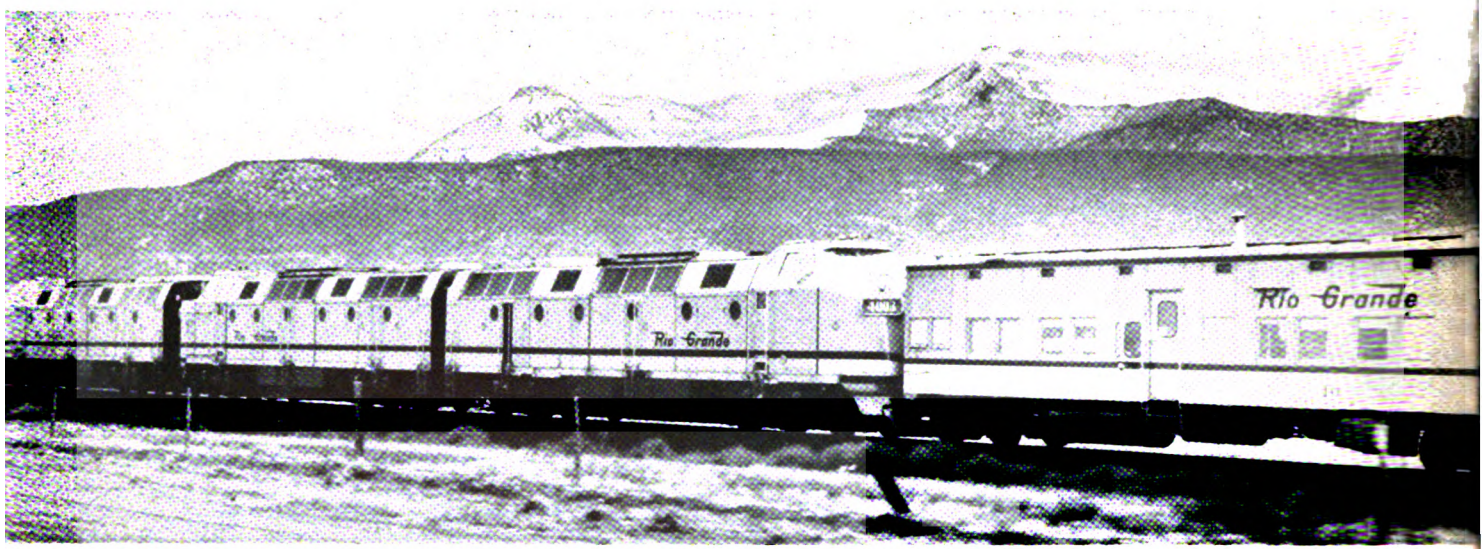
"The cost of owning and operating solid bearings in freight service during 1961 (with an average of only 71.1% of cars equipped with lubricating devices) was only $1.56 per car set more than the annual cost of owning roller bearings.

"The annual added carrying charges for the additional investment in a roller bearing car is $52.71 per year as compared with a solid bearing car. This cost, plus the additional cost of operating roller bearings would now result in a substantial economic loss. Therefore, in view of the greatly improved performance record of solid bearings with lubricating devices the application of roller bearings to the average freight car in general interchange service is not economically justifiable."

AAR 1955 Conclusions

The Magnus report also included, as information the conclusions of AAR Report 20000. These are as follows:

- "The savings per year per car resulting from the use of roller bearings is $38.55, based on an average annual mileage per year of 16,200 miles. This is based on a table, D 'Estimated Annual Labor and Material Maintenance Costs.' [It shows total annual costs per car with all freight cars equipped with plain bearings to be $82.15, the total annual costs per car with all freight cars equipped with roller bearings to be $44.27. The difference in favor of roller bearings is $37.88. To this difference was added an additional savings for car time of $0.677 making a total savings of $38.557.—Ed.]
- "The break-even point of the total expenditure that can be made in equipping freight cars with roller bearings is $511.91 per car.
- Cost of changes to existing cars to adapt them for roller bearings is $112.85 not including cost of bearings.
- "The break-even point of the material cost that can be paid for roller bearing assemblies for existing cars is $466.96 not including cost of applying bearings to the cars.
- "The break-even point of the material cost that can be paid for roller bearing assemblies for new cars is $584.55 because of credits for plain bearing material not used.
- "The use of roller bearings will produce certain desirable benefits which are not necessarily economic, but extremely important. These are: Better safety record, fewer schedule delays, and better relationship with shipper and passengers."

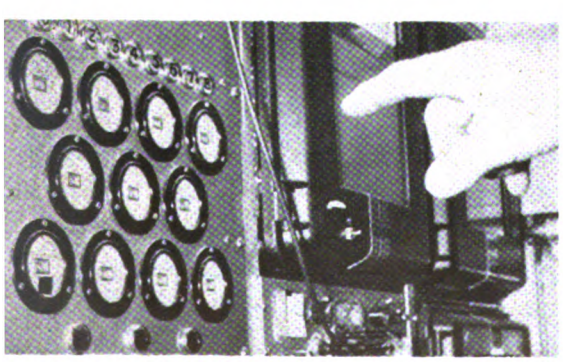


Rio Grande dynamometer car has been used intensively since German-built diesel-hydraulics went into service on the road in mid-November.

D-H Test Aided by Dynamometer Car

Road tests currently being conducted by the Denver & Rio Grande Western with its new 4,000-hp diesel-hydraulic road freight locomotives (RL&C, Sept. 1961, p 23) involve the dynamometer car which the D&RGW put into service last year. While diesel-electric locomotive tractive effort can be calculated from current and voltage measurements made at the locomotive main generator, diesel-hydraulic locomotive output must be determined by measuring the locomotive's drawbar pull.

Strain gages, located around the shank of the dynamometer car's coupler, produce readings which can be read as drawbar pull, or braking retardation, on the car's instrument panel. According to the Rio Grande, "because the Krauss-Maffei units are powered with hydraulic transmissions, there is no other way to measure engine output." From the drawbar pull readings, the Rio Grande is making careful checks of the adhesion characteristics of the German-built diesel-hydraulic locomotives. Without sand on clean, dry track, values of 30% are claimed for them as compared with the 20 to 25% common for diesel electrics.



Indicators and chart recorders are conveniently arranged on the instrument panel of the car.

The instrument panel is equipped with meters necessary to make complete analyses of train operations. The panel contains time recorders and lights to indicate and record throttle notch, dynamic brake setting, wheel slip actions, and engine alarm indications. This information is also recorded on a strip chart which has a mile post pen marker so all data can be properly correlated. Train speed, main generator volts, and amperes can also be recorded when a diesel electric is under test.

Following its completion at Burnham shop in Denver in August, the dynamometer car made its first trip early last September behind EMD GP-20 demonstrator locomotives. The car's arrangement was based on Electro-Motive's test car 909 and on the dynamometer car of the German Federal Railways. The D&RGW car, originally a World War II troop sleeper and later an extra gang sleeper, contains complete facilities and bunks for six men. A 10-kw diesel generating set provides electrical power for instruments, appliances, and limited kitchen facilities.

A 16-point temperature recorder (0 to 400 deg F and 0 to 1,200 deg F) and a 50-point temperature indicator (0 to 1,200 deg F and 900 to 1,800 deg F) are also installed as part of the test equipment. These can be used for measuring temperatures in engine air intakes and in the cooling, lube oil, exhaust, and fuel systems. Transmissions, gear boxes, and hydrodynamic brake couplings on the diesel-hydraulics have been equipped with thermo-couples so that temperatures in these components can be measured and recorded.

Tachometer generators are connected by V-belts to each end of an axle at the forward end of the dynamometer car. These are used to record train speeds and distance traveled. A tooth, placed on one pulley, activates an electro-magnetic pickup which pulses each time the pulley makes one revolution. There are 602 wheel turns per mile. A counter will indicate the mileage from Denver or Salt Lake City. This information will be marked automatically on each recorder chart in the instrument panel.

Dynamometer No. 10 is part of a two-piece unit designed to improve locomotive and train operation. The other portion will be a box car housing a 16-cylinder EMD engine, a-c generator, and complete fuel, lubricating oil, and cooling systems. The generating set can operate either as a source of alternating current (1,000 kw) for electric power, or as a test engine for evaluating fuels, lubricants, and engine modifications. No. 10 will provide controls and instruments necessary to operate the test engine.

Through the Open Door

By Gordon Taylor

"Nearly all diesel troubles have one thing in common; they enter any door that is left open for them. Preventive maintenance properly planned and carried out will close the doors by which most of these troubles enter," Doc observed one day. "A troublesome diesel is never greedy; it always passes its trouble on to maintenance men. Maintainers are then stuck with it until they can locate and remove the cause of the trouble. It's easier to close the door against trouble by proper cleaning and inspection of equipment than it is to locate and correct the cause of trouble."

Doc continued, "The reason that I mention cleaning is that dirt in its various forms is Diesel Enemy No. 1. When we eliminate dirt, we eliminate a real trouble maker. Another item to watch out for is the condition of control and power contacts."

At this point, the visitor in Doc's office spoke up. "Could you illustrate your point by telling me about a really unusual case—trouble that could have been headed off by careful inspection and repair?"

"I certainly can," replied Doc, "I believe I've one that can be classed as unusual. It was a real puzzle to the engineman when it occurred far from home. One of our passenger trains was delayed about four hours when the engines on both units died and could not be restarted. It was like this: At one of our terminals it became necessary to dispatch an E8 passenger unit in multiple with a GP7 road switcher, the E8 unit being in the lead. The engineman was instructed not to exceed 65 mph because that was the limit for the GP7. At a point about 60 miles out, while traveling 50 to 55 mph, the lights on the lead unit dimmed for a moment. At the same time the engines seemed to be losing power. The engineman moved the throttle to idle speed and brought the train to a stop. He found the No. 1 engine in the E8 running at very slow speed and about to stop. As he turned to check the ground relay, he heard the No. 2 engine slowing and a few seconds later it had also come to a stop.

"Because both engines had stopped, the engineman thought the trouble must be a lack of fuel. After operating all circuit breakers and control switches with no favorable results, the probability that the unit was out of fuel seemed even greater. In addition, there was now no fuel in the fuel sight glasses.

"Thinking that the emergency fuel shut-off valve beneath the floor might have been tripped, this next received attention. Because it was night, it was not easy to check the position of this emergency valve. The engineman went to the passageway between the two diesel engines and raised the access cover in the floor to reach the reset device that opens the emergency fuel valve when it has been tripped.

"Because the position of the reset plunger did not indicate clearly whether the emergency fuel valve was open or closed, it was decided to pull one of the emergency trip cables to be sure the fuel shut-off valve was definitely closed. It would then be possible to push down on the reset plunger and know that the fuel valve had been properly opened. In the meantime, the conductor had contacted the dispatcher on the locomotive's radio, telling him that a relief locomotive might be needed.

"When the engineman tried to trip and reset the fuel cut-off, his efforts were thwarted because of the misalignment of reset rod and the short length of the pull cable which fouled the reset mechanism. This prevented the opening of the fuel supply valve and created a new problem.

"Now that the fuel supply was completely cut off from the engines on the lead unit, attention was turned to the GP7 trailing unit. Imagine the surprise when it was found that the engine on this unit had also stopped. Bad luck was really on the prowl that night. All the usual methods of starting the engine were immediately tried. Nothing happened. Now there were dead engines on both units and no way to start them. It was time for some clear thinking. Even though the fuel supply valve on the lead unit had been closed, it could not have affected the trailing unit. That engine would be getting its fuel supply from its own fuel tank.

"Because fuel-valve trouble could be ruled out for the rear unit, it was decided that the trouble on that unit might be caused by a defective jumper cable. But changing cables produced no better results. For lack of something better to try, the jumper cable was removed from between the two units and another attempt made to start the engine on the trailing GP7. This effort was rewarded with success. However, that lone GP7 was not powerful enough to handle the train. Because a freight locomotive had now come to the relief of the passenger train, no more effort was made to get the passenger units operating.

"The dead passenger units were placed on a siding, and the freight locomotive proceeded with the passenger train. A relief crew from the nearest terminal brought out a freight locomotive to power the freight train that had given up its locomotive. The relief crew, finding that the engine on the GP7 unit could be operated, used that unit to tow the dead E8 unit.

"Inspection at the home terminal revealed these conditions on the E8: the emergency fuel valve was in a partially open position due to the fouling of the reset mechanism. This had occurred when the locomotive had gone into the back shop for repairs that involved some work around the fuel tank. Some one failed to align the reset rod properly and to check the pull cables. The valve had worked well enough to get the locomotive out of the shop, but, because no periodic checks had been made, a reliable emergency fuel valve had not been available when it was needed.

"Next check was the jumper cable receptacle on the GP7 unit. Remember that its engine could not be started until the jumper cable had been completely removed from the receptacle. It was found that two contact pins in the receptacle had split and made contact with each other. Apparently these pins were not in contact constantly. It had taken vibration and movement

Freight and Passenger Car Charts

These charts are very helpful to AAR billing clerks, mechanical engineers, purchasing and stores personnel, car inspectors, write-up men, car foremen, and anyone else who needs a knowledge of car parts and their relation to each other.

The charts include a cutaway diagram of the car and a listing of important parts with arrows showing where the part is located. These charts are a part of standard training programs used on a number of major railroads.

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- ☐ Refrigerator Car, wood sheathed, steel underframe, 1920 design (14x20 inches)

2-62

Name _____

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City _____ State _____

Job _____ RR _____

of the cable during the locomotive's 60-mile trip to bring the contact pins together. One pin was N-4, the negative return wire for all other control wires. The other pin was RE-9, which is a control wire involved in reverser operation.

"You may think that, because the train was going forward, the RE-9 reverser wire could not be involved. Here is how: the FO-8 and RE-9 wires in all jumper cables are crossed. In other words, a control wire will connect at one end with the RE-9 pin contact and at the other end with the FO-8 contact. This is the arrangement which makes it unnecessary to be concerned about which way a unit is headed in a multiple-unit consist (Case of the Backward F7, RL&C, May 1959, p 48). The short circuit between the No. 9 and No. 4 contact pins in the receptacle on the trailing unit created a short circuit between FO-8 and N-4 wires, making connections that caused the following action: the control circuit breaker on lead unit opened with the passage of excessive current. This cut off the current to the PC wire, opening the PC relay which, in turn, opened the FP relay. The fuel pump circuit in the control unit energizes the fuel pump control wire that extends through all units. This FP wire, when dead, shuts down fuel pumps in all units, and that is exactly what happened in this case.

"Had the engineman thought to check the condition of the trailing unit when the failure occurred, he would have saved himself a lot of trouble. Immediately he would have known that the emergency fuel cut-off on the lead unit could not be causing the trouble on the second unit. This would have directed his attention away from the emergency fuel cut-off and, perhaps, caused him to consider the jumper cable.

"However, this case was so unusual that the crew had no reason to suspect that trouble on the rear unit was causing failure of the lead unit. In fact, this is the first case in my experience where jumper cable trouble in a rear unit caused failure of the lead unit.

"I can well understand how the engineman was fooled. As he later said, 'When you have both engines shut down on the lead unit and can't get them started, you have one engine-room full of trouble. It doesn't seem worthwhile to go outside looking for more trouble. I stayed where I thought it would do the most good. When you're shooting rats, you stay near the rat hole, and I thought the rat hole must be on the lead unit. I was wrong.'

"From all this there are some lessons to be learned. If the engines die on leading units, enginemen should take a quick look in trailing units to see if the engines there are also shut down. If they are, remove the jumper cables. Then, if the lead unit engines fail to start, you may feel reasonably certain that the trouble is on the lead unit. Check to see if the fuel pump control circuit is operating properly. Also carefully check the control circuit to see that its fuse, or circuit breaker, is in working order. When engines are again running on lead unit, restore the jumper cable and start the engine on trailing unit.

"This case clearly puts the spotlight on maintainers' duties that were neglected. Make careful inspections of emergency fuel shut-off valves. Know beyond a doubt that the trip mechanism will work and that the valve can easily be reset to its open position after it has been tripped. Electricians making mileage inspections should, with a good flashlight, examine all contact pins in jumper cable receptacles.

"Contact Pin 4 can be real trouble maker because it is part of return circuit for the control signals sent out by all other control wires. As you look into the 27-conductor receptacle, you will find Pin 4 is second from left-hand side in the second row from the top. Give it special attention.

"I believe this case fully supports my contention that proper preventive maintenance is a 'must' for successful diesel performance. Every dollar spent for *proper* preventive maintenance will return several dollars in reduced operating costs. In this case, a split contact pin caused a four-hour delay to a passenger train and an even longer delay to a freight train. Then there was the cost of sending a relief locomotive to handle the freight train and a trip for the crew that moved the passenger locomotive back to its terminal. This one failure completely disrupted schedules on the railroad for several hours."

Doc concluded his talk by saying, "I will wrap up this case by leaving with you the thought that neglected preventive maintenence becomes a ghost that will plague you later by opening a door for diesel troubles to enter."

Report

(Continued from page 8)

rels. Where this is the case on existing overhead electrifications, some expense is incurred in gaining additional height. In future electrifications, there should be no problem.

The claims that energized wires create hazards that result in lawsuits when persons are injured or killed do not recognize that, on the average, the cost of lawsuits is no higher in electrified territory than in non-electrified territory.

The high cost of securing adequate electrical clearances, particularly for high-voltage systems at overhead bridges and tunnels is an important factor only in such places as England where low overhead bridges and tunnels are numerous. As new bridges are built in the U.S., the height from rail to underside of bridge is usually adequate to eliminate this problem.

Motive-power interchange problems where there is more than one system of electrification involved will affect a few railroads in the U.S. if they extend their existing electrifications with the 60-cycle system. However, the French state that the additional cost will not be significant. With railroads not yet electrified, there will be no problem.

Electrolysis problems in the case of d-c systems have proved to be of minor nature. With the commercial frequency a-c system, it should not exist.

Outside television and radio interference has been grossly exaggerated and is of very little consequence. Where it does exist, it is resolved at small expense.

The vulnerability of electrified systems during wartime is indicated by the English, French, and Japanese experience during heavy bombing when the electrification facilities were restored before the track was ready for operation. The oil supplies of the diesel-electric locomotives, usually stored in immense exposed storage tanks, are quite vulnerable to enemy attack.

Letter to the Editor

Inspection vs Cleaning

To the Editor:

In your Diesel Maintainers Note Book, RL&C, December 1961, Doc Watts does a good job of educating his associates on modern practices for rolling stock maintenance. They should regularly read RL&C and keep posted, but I suggest that he missed the boat with his comment "Labor used in cleaning could better be spent on inspection and repair."

Unfortunately, in my opinion, this is the philosophy of too many supervisors at the shop level. Certainly we must strive to reduce the necessity for as much cleaning as possible by eliminating oil and water leaks, flashovers, and other abnormal conditions that can be corrected, but let us not overlook the fact that a clean machine is easy to inspect and requires the least repair for the same number of horsepower hours.

Instead of searching for labor for inspection duties, I suggest we should diligently strive to reduce inspection time. Inspection never added a minute's life or service to a machine. Most machinery and apparatus must be cleaned before it can be properly inspected, and I suggest that the best inspection is made during the cleaning operation. The exception to the rule would be internal components of an internal combustion engine which are not easily inspected under assembled conditions.

Did I misinterpret Doc's remark, or was Doc guilty of our common failing—not saying precisely what we mean?

C. W. Martin
Assistant Engineer—Diesel Electric, Baltimore & Ohio

Personal Mention

Baltimore & Ohio.—Regional organization of mechanical department being replaced by an alinement under which all personnel will report in direct line of authority to system headquarters at Baltimore, Md. *Baltimore.*—Vincent P. Morgan appointed to newly created post of manager of mechanical planning and production, mechanical department, immediately subordinate to the chief mechanical officer. Mr. Morgan formerly assistant manager-methods, research and procedures.



Elmer A. Kuhn
C&O



Kenneth T. Reed
C&O



Frank A. Danahy
NYC

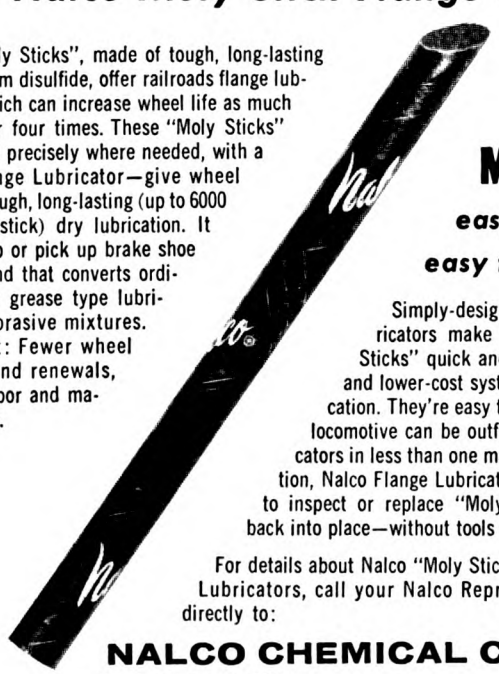
Canadian Pacific.—*Montreal:* W. V. Miller appointed master mechanic, Laurentian division.

Chesapeake & Ohio.—*Richmond, Va.:* Elmer A. Kuhn appointed mechanical assistant

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With Nalco Moly Stick Flange Lubricant

Nalco "Moly Sticks", made of tough, long-lasting molybdenum disulfide, offer railroads flange lubrication which can increase wheel life as much as three or four times. These "Moly Sticks" are applied precisely where needed, with a Nalco Flange Lubricator—give wheel flanges a tough, long-lasting (up to 6000 miles per stick) dry lubrication. It won't creep or pick up brake shoe dust or sand that converts ordinary oil or grease type lubricants to abrasive mixtures. The result: Fewer wheel turnings and renewals, reduced labor and material costs.



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easy to install,
easy to maintain

Simply-designed Nalco Flange Lubricators make application of "Moly Sticks" quick and easy—a far simpler and lower-cost system than "wet" lubrication. They're easy to install, too: a diesel locomotive can be outfitted with eight lubricators in less than one man-day. After installation, Nalco Flange Lubricators can be swung out to inspect or replace "Moly Sticks" and swung back into place—without tools or special equipment.

For details about Nalco "Moly Sticks" and Nalco Flange Lubricators, call your Nalco Representative, or write directly to:

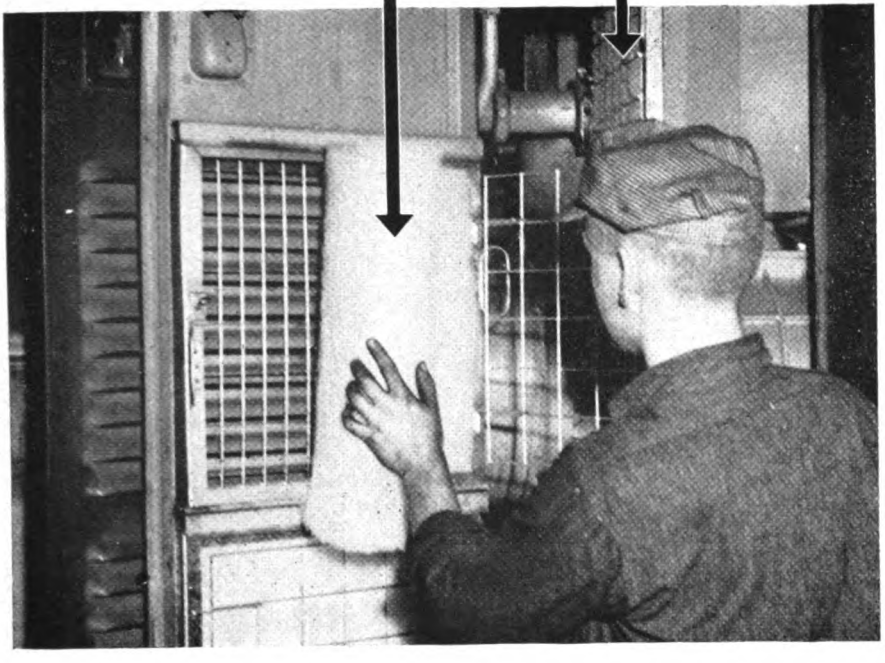
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AAF American Air Filter

BETTER AIR IS OUR BUSINESS

to M. I. Dunn, senior vice-president. KENNETH T. REED, assistant chief mechanical officer, appointed chief mechanical officer, succeeding Mr. Kuhn. *Russell, Ky.:* RUSSELL G. BIAS appointed general foreman—day, and THOMAS E. CALLIHAN, general foreman—night, car department.

ELMER A. KUHN began his railroad career in 1917 with the Toronto, Hamilton & Buffalo at Hamilton, Ont. After graduation from the University of Pittsburgh in 1920, he joined the Nickel Plate. From 1929 to 1932 he was assistant engineer of motive power on the joint Chesapeake & Ohio-Nickel Plate-Pere Marquette Advisory Mechanical Committee at Cleveland. Other posts included master mechanic, superintendent of motive power, and general superintendent motive power and machinery. He became chief mechanical officer in 1956.

KENNETH T. REED, a graduate from Ohio State University, began his career in 1922 at Grand Rapids, Mich., as division superintendent of the C&O. Subsequently was division superintendent at Grand Rapids, general superintendent at Peru, Ind., assistant regional manager at Detriot, general superintendent transportation, assistant regional manager at Huntington, W. Va., and, most recently, assistant chief mechanical officer.

Elgin, Joliet & Eastern.—*Gary, Ind.:* LANCE T. HOWARD appointed general car foreman. OLIVER G. HILBRICH appointed general inspection foreman.

New York Central.—*New York:* FRANK A. DANAHY appointed chief mechanical engineer. Mr. Danahy formerly assistant general superintendent, diesel and electrical shop, Harmon, N.Y. H. LIEBERT appointed equipment engineer—special projects. Position of manager equipment engineering services abolished. T. R. FREDRIKS appointed mechanical engineer—car, succeeding GORDON T. WILSON, retired.

Pennsylvania.—*Harrisburg, Pa.:* R. G. MULLIGAN appointed assistant road foreman engines. *Enola, Pa.:* S. P. PARK, appointed assistant foreman — enginehouse. F. B. SCHNEIDER, JR., appointed assistant foreman —diesel.

Pittsburgh & West Virginia.—*Pittsburgh, Pa.:* W. K. KEARNS, chief engineer, appointed also chief mechanical officer.

Reading.—*Reading, Pa.:* J. E. DATTNER appointed superintendent car department.

Southern.—*Macon, Ga.:* O. C. MCKINNIE appointed general foreman. *Asheville, N.C.:* A. C. RAWLS, JR., appointed general foreman.

Southern Pacific.—*Houston, Tex.:* T. O. SIEGMUND, assistant superintendent of shops, named master mechanic, Houston and Lafayette divisions, succeeding P. B. RICE, retired.

Western Maryland.—*Hagerstown, Md.:* WALTER C. KRESGE appointed superintendent car equipment. Mr. Kresge formerly superintendent equipment, Pittsburgh & West Virginia.

Supply Trade Notes



Louis M. Bowne
Oakite



W. E. Clancy
Stackpole

OAKITE PRODUCTS, INC.—*Louis M. Bowne* appointed railway service division manager. Mr. Bowne previously special representative of railway division, covering northeastern states.

■

STACKPOLE CARBON CO.—*William E. Clancy* appointed general manager, Carbon Division, succeeding *Harrison C. Stackpole,* president (RL&C, Jan., p 44). *Douglas R. Dobson* named Carbon Division sales manager, succeeding Mr. Clancy. *Franklin H. Kilpatrick* named manager, and *Clyde E. Robinson,* sales manager of new Electromechanical Products Division formed for the manufacture of resistors, switches, and other electro-mechanical products.

■

SKF INDUSTRIES.—New $2.5 million engineering and research building to be constructed at King of Prussia (Pa.) Industrial Park. Site replaces earlier plans to build facility at Radnor, Pa.

■

MORRISON INTERNATIONAL CORP., INTERNATIONAL CAR DIV.—Headquarters moved from 2485 Walden ave., to 835 Englewood ave., Buffalo 23, N. Y.

■

COLORADO FUEL & IRON CORP.—*Floyd O. Johnson,* assistant to the general manager of railroad sales, appointed manager of railroad sales at Denver, Colo., succeeding *William S. Boyce,* general manager of railroad sales, retired.

■

TOLEDO-BEAVER TOOLS, INC.—*Toledo-Beaver* is a merger of the *Toledo Pipe Threading Machine Co.,* Toledo, Ohio, and *Beaver Pipe Tools, Inc.,* Warren, Ohio. Main offices, Toledo. *Russell Herig,* who formerly directed Beaver sales department, is sales manager of combined sales force.

■

GENERAL STEEL INDUSTRIES.—*St. Louis Car Co.,* formerly a wholly-owned subsidiary of General Steel, has been merged into the parent company as the *St. Louis Car division. Edwin B. Meissner* continues as president of St. Louis Car division. *Winthrop B. Reed,* GSI vice-president, appointed vice-president and general manager of St. Louis Car. *Thomas C. Barton, Jr.,* formerly manager, GSI western sales, now manager of sales, St. Louis Car.

■

LFM MANUFACTURING CO.—*Gustav B. Sundby* appointed chief engineer at Atchison, Kan. Mr. Sundby, before joining LFM, a subsidiary of Rockwell Manufac-



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... lasts longer
... saves money

Lix Surface Cleaners are sprayed on and rinsed with water or mineral spirits . . . surface comes shining through—bright as new!

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Lix Cleaners last longer because they go further . . . without additional charges, thus saving you money.

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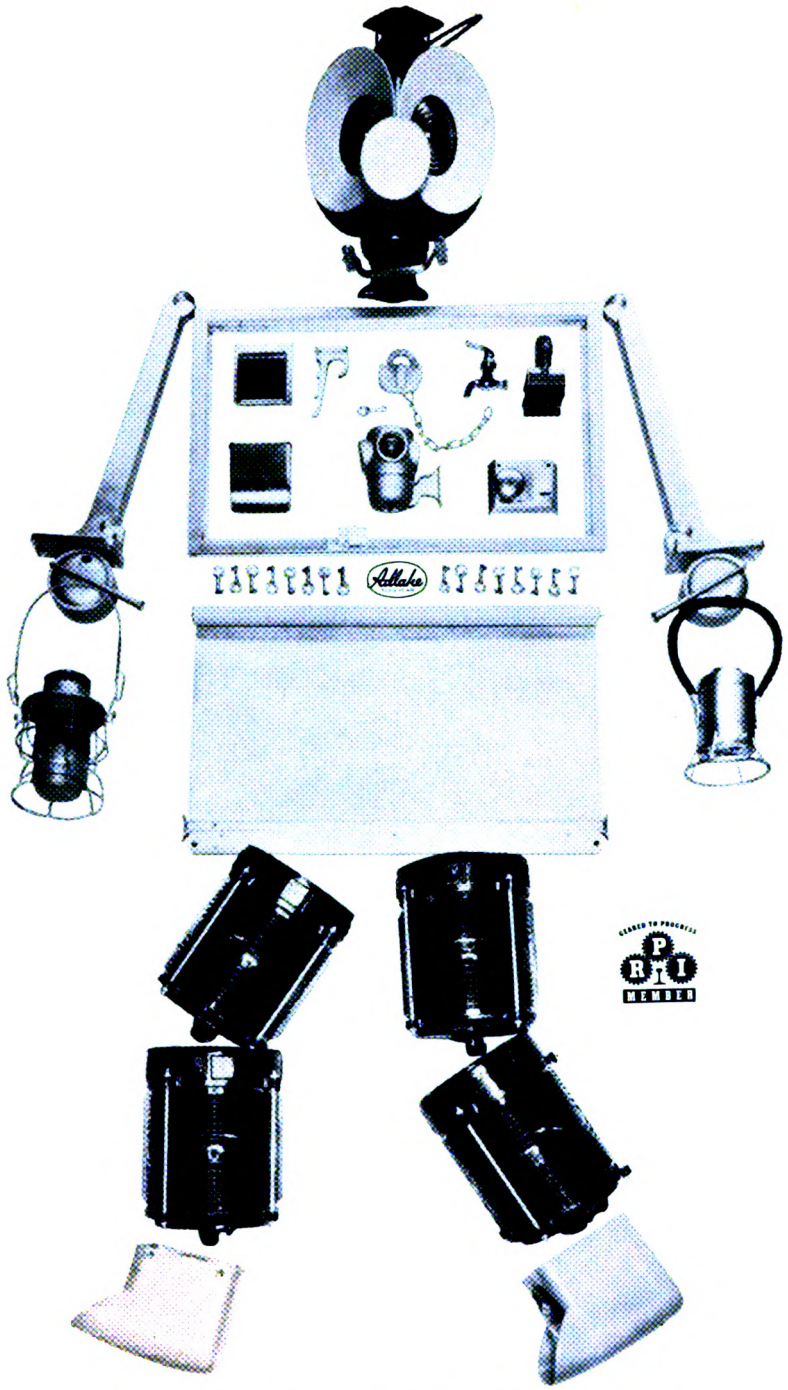
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turing Co., conducted studies on the dynamic loading of freight cars at Pullman-Standard and performed project engineering duties in railroad research department of A.S.E.A. in Vasteras, Sweden.

■

AMSTED INDUSTRIES INCORPORATED.—*Amsted Industries* now corporate name of former *American Steel Foundries.* Transportation Equipment and Hammond divisions to be operated as *American Steel Foundries, Inc.*, a subsidiary of Amsted Industries. (RL&C, Dec. 1961, p 49).

■

GRIFFIN WHEEL CO.—*John E. Bossong* elected vice-president of Griffin, a Chicago subsidiary of Amsted Industries. Mr. Bossong formerly manager of operations, Griffin wheel division, ASF.

■

FINE ORGANICS, INC.—A new 4,000 sq ft laboratory opened at 205 Main st., Lodi, N. J. Expansion of plant and laboratory facilities started in 1961 and cost over $200,000.

■

ENTERPRISE RAILWAY EQUIPMENT CO.—Chicago offices moved to 8754 South Dobson ave., Chicago 19.

OBITUARY

FAY THOMAS, formerly general superintendent, diesel electric, New York Central, and, since October 1955, manager of railroad sales, Chromium Corp. of America, Cleveland, died on January 21.

Trade Publications

VINYL CAR COATINGS. Bulletin No. 510 describes application procedures and specifications of ADM Freight Liner vinyl coating for steel cars used in chemically corrosive service. (Write: *Freight Liner Dept., Archer-Daniels-Midland Co.*, Dept. RLC, 700 Investors Bldg., Minneapolis, Minn.)

ELASTIC STOP NUTS. Design Manual No. 6111 describes extra-thin, insert type, self-locking hex nuts for bearing retaining applications. (Write: *Elastic Stop Nut Corp. of America*, Dept. RLC, 2330 Vauxhall Road, Union, N. J.)

INDUSTRIAL GAS. 48-page, pocket-sized booklet, Form ADE-890, lists physical and chemical properties of oxygen, nitrogen, argon, helium, hydrogen, carbon dioxide, acetylene, neon, krypton, and xenon. Also gives capacity data on industrial gas delivery and storage systems. (Write: *Air Reduction Sales Co., a division of Air Reduction Co.* 150 E. 42nd st., New York 17.)

COUPLINGS. 16-page booklet, No. SDP-3, describes "How V-Band Coupling Concept Offered Design Advantages for a New Type of Tube and Pipe Joint." Diagram of piping system shows how fewer joints are required when using this joining method than when using conventional joints. (Write: *Aeroquip Corp., Marman Div.*, Dept. RLC, 11214 Exposition Blvd., Los Angeles 64, Calif.)



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F.O.-300

FINE ORGANICS' NEW SYNTHETIC EMULSION DEGREASER REDUCES DOWN TIME — MAN HOURS — SAVES MONEY!

NO JOB TOO TOUGH FOR INTERIOR DIESEL MAINTENANCE! F.O.-300 is perfect for washing down diesel motors... keeps walls and floors clean and safe. This heavy-duty degreaser cleans maintenance-of-way equipment, roundhouse and diesel shop floors and pits, radiator exteriors, gears, gear cases. Great for trucks and underframes of passenger coaches... for diesel vat and back shop cleaning where there are no heating facilities. F.O.-300 has the quick-action and built-in power economy-conscious railroads need!

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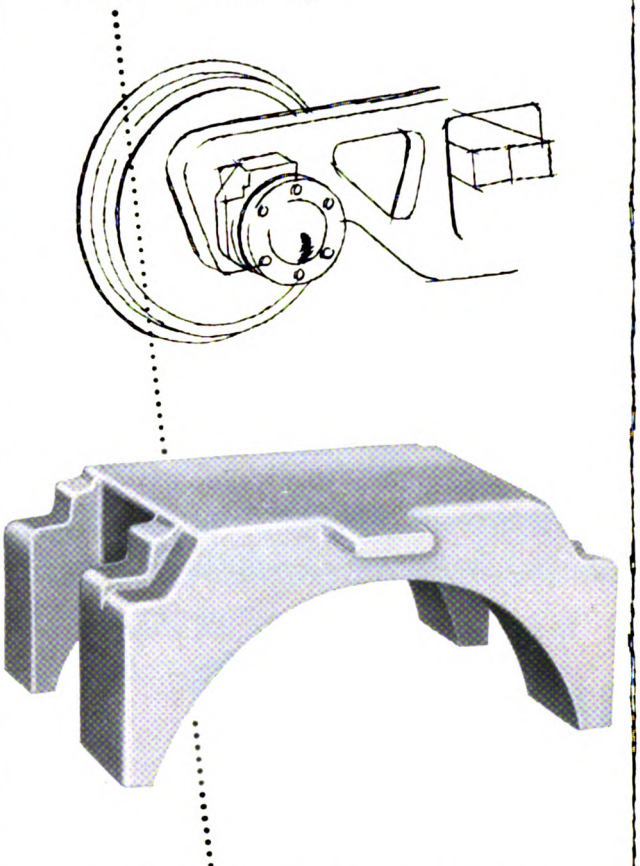
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Specify
NATIONAL ADAPTERS
for
all freight car truck roller bearings



- AAR Standard Adapters—for AAR Alternate Standard Narrow Jaw Pedestal and Integral Journal Box Side Frame applications; for Roller Bearing Units of All Manufacturers.
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Transportation Products Division
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BALCRANK — "Little Giant" HY-SPRAY Airless Equipment and "Surface-Klean" Pump —SAVE BOTH LABOR AND MATERIALS.

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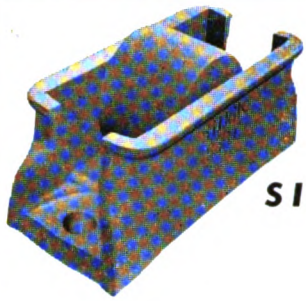
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Surface-Klean Pumps (air operated) are ideal for all cleaning operations such as homes, commercial buildings, walls, floors and machinery. Perfect for maintenance cleaning and surface preparation prior to painting. Two models available:
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5 lbs. of special detergent compound supplied with each pump.

"LITTLE GIANT" HY-SPRAY Airless Spray Equipment (Air Operated)

Sprays all types of paint, including water base. Light weight, portable unit attaches directly to 5-gallon paint cans. Up to 40% paint saving over conventional air spray. No booth or exhaust fan equipment required as there is practically no overspray. Fast set-up and elimination of masking saves time and labor, cuts cost of entire painting operation. Also available in 5 and 10-gallon portable and 55-gallon stationery units.
SPECIFY BALCRANK FOR ALL PUMP REQUIREMENTS:
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air filters give LONGER SERVICE with LESS MAINTENANCE than all others!

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- ULOK Air Filters operate at high efficiencies throughout their useful life and are not affected by snow, moisture, and low temperature. A self-sealing edge prevents by-pass of unfiltered air.
- All the face area of ULOK Air Filters is available for filtration; the strength of the low density batt eliminates need for air-restrictive face supports.
- 100% longer service life — unique construction of the filter batt resists face-loading . . . permits uniform depth-loading.

ULOK Air Filters are light weight; easy to install; require no washing; resist vibration; and are free of oils, adhesives, and splinters.
Case histories of ULOK Air Filters in use on major railroads are available on request. Consult a ULOK engineering specialist for assistance on your particular application. For information write . . .

UNION CARBIDE DEVELOPMENT COMPANY
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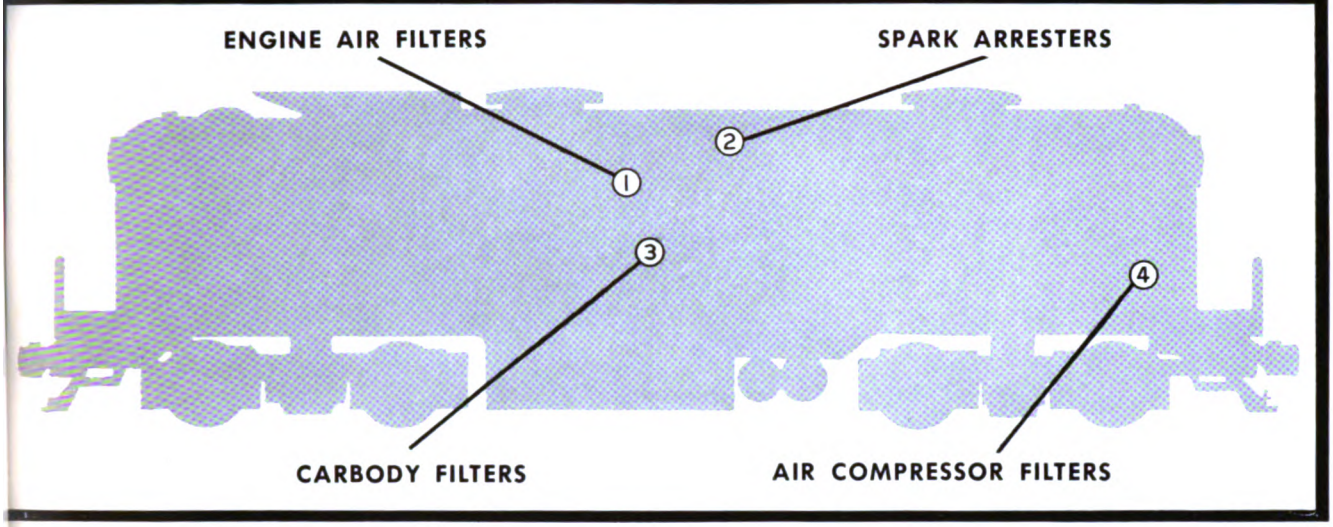
A nationally known manufacturer and supplier of railroad products has several openings in their sales organization for territorial exclusive sales representatives on straight commission basis. Give full particulars as to experience, territory and accounts now covered, and present principal connections. Box 262, Railway Locomotives and Cars, 79 West Monroe Street, Chicago 3, Illinois.

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Specify AIR-MAZE when rebuilding..

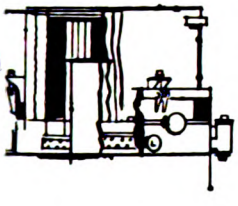
Engines perform better...longer!



Whether you or the manufacturer rebuilds your locomotives, be sure to specify and use Air-Maze filtration products. Thirty-five years of filtration experience assures the Railroad Industry of maximum performance.

The following are examples of the variety of Air-Maze filtration products for diesel locomotives

(1) ENGINE AIR FILTERS



OIL BATH filter removes up to 97% of objectionable dirt . . . requires only semi-annual oil changes and annual cleaning.

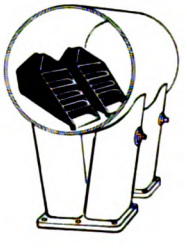


PANELBATH filter replaces and upgrades oil wetted and centrifugal panel filters . . provides effective dirt removal . . low initial cost . . simple to install.

GEARED TO PROGRESS
P R I
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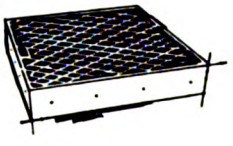
The Best Names in Diesels Are Protected by Air-Maze Filters. Contact your locomotive builder or write us for further details.

(2) SPARK ARRESTERS



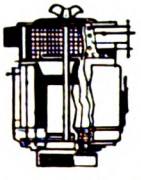
Designed for EMD and EM manifolds . . . utilizes principle of centrifuging incandescent particles to reduce particle size prior to leaving exhaust stack.

(3) CARBODY FILTERS



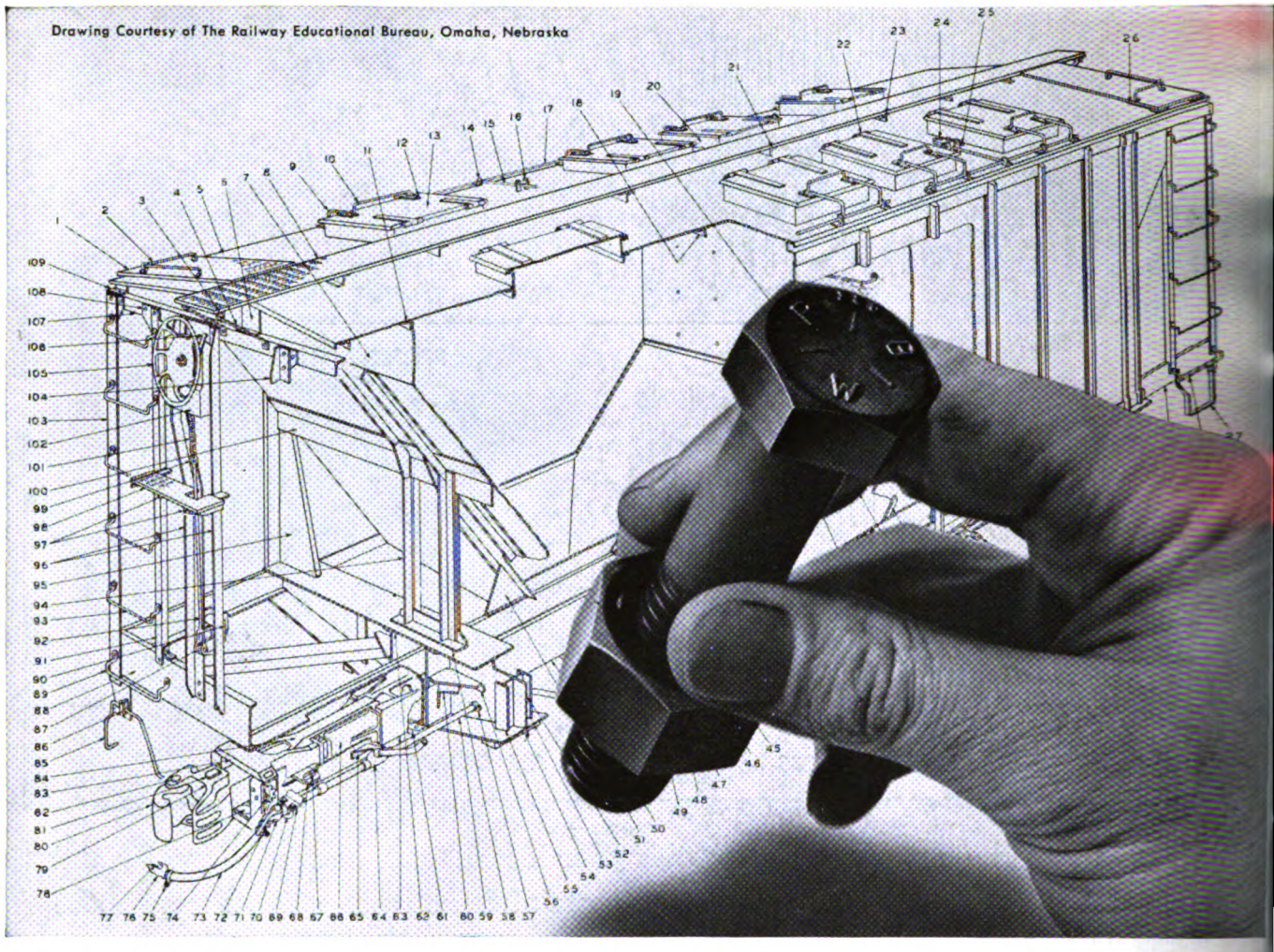
Designed to filter effectively . . . rugged construction assures long life.

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Cut compressor wear . . . simple installation and servicing . . . available for all compressor models.

AIR-MAZE DIVISION
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ROCKWELL STANDARD
ROCKWELL-STANDARD CORPORATION



Where would you use high strength bolts to construct a permanently-tight hopper car?

Wherever you have a problem joint —wherever shock, vibration and impact under high loads so often cause rivets to loosen or fail—that's where RB&W High Strength Bolts belong.

Unlike rivets, high strength bolts stay tight, exert over twice as much force on a joint. In fact, clamping strength is so great that the resultant frictional force between bolted members—not just the shear strength of the fastener as with a rivet—helps keep the joint from failing under rough service.

RB&W's High Strength Bolts are easy to install in new cars or cars being rebuilt, particularly where quarters are cramped. Instead of four-man riveting crews, two men—sometimes only one—can do the job. This reduces assembly costs. Saves time and money on future maintenance, too; keeps rolling stock in service longer, instead of being returned to the shop for repairs.

When rivets fail, trouble begins. Save yourself needless costs by calling in an RB&W engineer to show you exactly where to use high strength bolts in a hopper car...or any other freight car, for that matter. Bulletin RR-3 tells more. Write Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, New York.



Plants at: Port Chester, N. Y.; Corapolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

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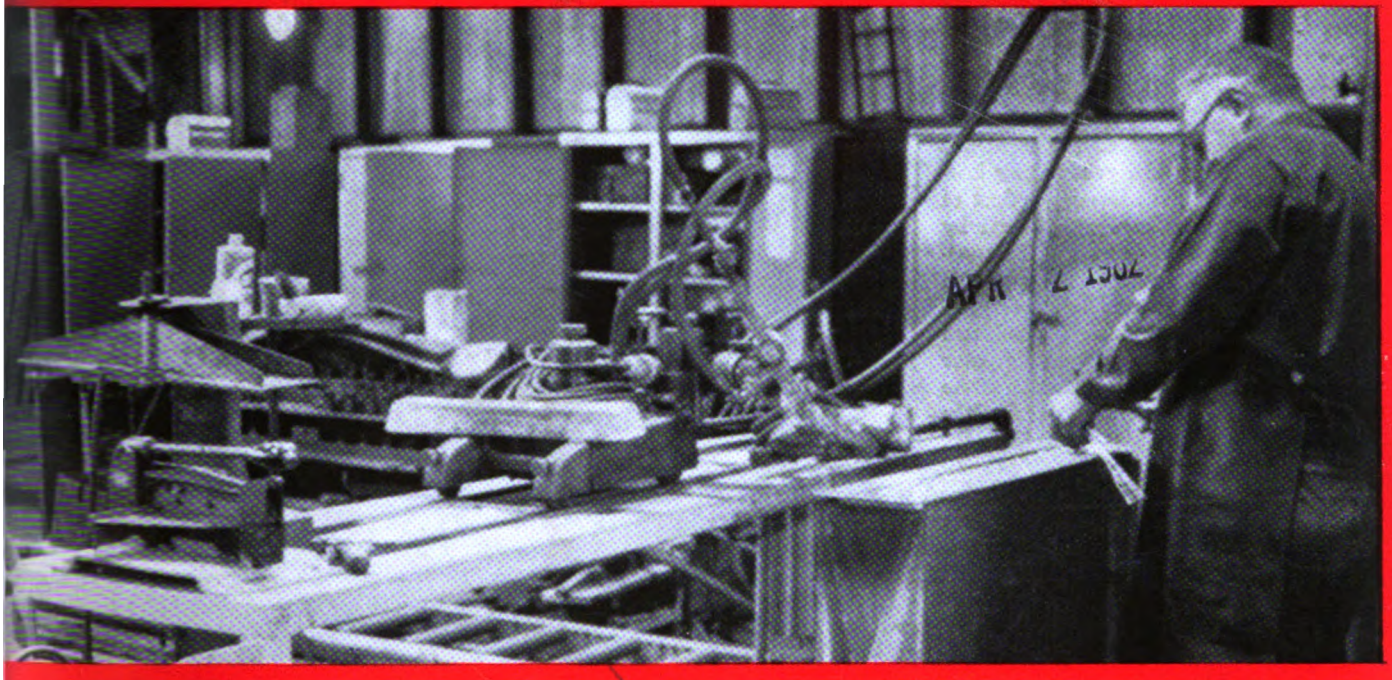
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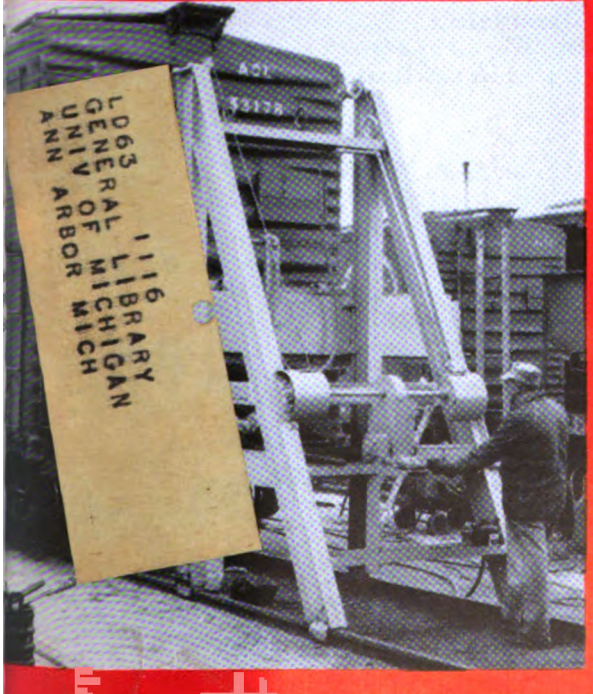
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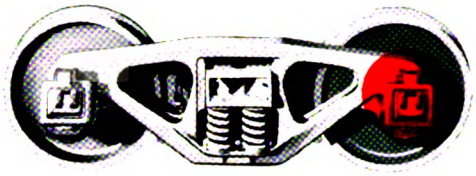


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Milwaukee Repairs Radiators on Production Line . . . page 19

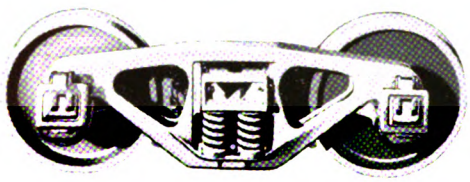
End Straightener for Atlantic Coast Line Box Cars . . page 38

Reader Service Coupon . . . . . page 50





WHICH ONE IS HOT?



You can never be sure without SERVOSAFE® Hot Box Detectives*

Ironically, many of the measures directed toward *preventing* hotboxes have the secondary effect of making them harder to detect by ordinary visual and manual inspection when they do occur. Improved lubricants withstand higher temperatures before breaking down and releasing tell-tale smoke. Lubricator pads, admirable successors to waste packing in most respects, are less subject to smoking and ignition. Roller bearings, with their fine record of performance, give virtually no warning short of burnoff when they do fail. Add to these problems of detection the greater speeds and heavier loads of the modern freight train and it is no wonder that derailments due to hotboxes continue to mount despite the most careful inspection procedures.

Long before a faulty bearing or journal begins to reveal its condition to the eye or hand, events take place within the journal box which are readily detected by a SERVOSAFE® system. An ultra-sensitive, high speed infrared element "looks" at the same area on all passing journal boxes, regardless of speed, and reacts individually to the heat radiating from each one. These responses are converted to electronic signals which are amplified and mechanically recorded to give a permanent record of all journals on the tra Hotboxes—even those that are j *beginning* to overheat—are ea identified by high "pips" on t SERVOGRAPH® chart. These pips not measurements of temperat but relative indications of overhe ing, using the normal average the other journals as the refere standard, plainly visible on the sa chart. The SERVOSAFE® system not intended to *replace* conventio inspection but, rather, to *supplement* it—with a degree of c tainty and reliability not possible to achieve by visual a manual means alone.

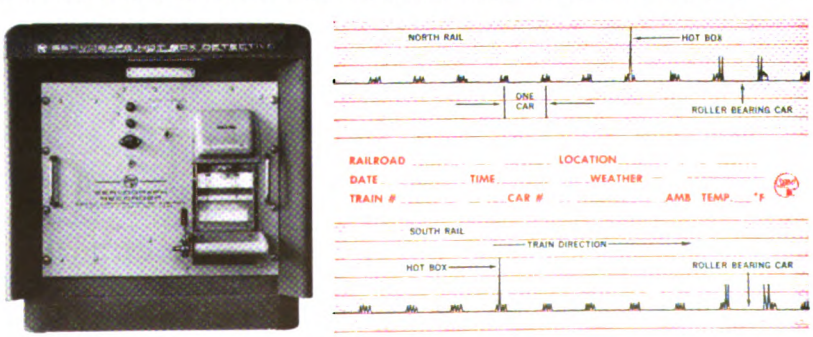
Inspectors on roads equipped with SERVOSAFE® Hot B Detective systems *know* when a journal is running hot. Th are informed of its location, even before the train reaches t yard. When the train pulls to a stop, inspectors concentr their attention on the "suspects"...take corrective action *bef* damage occurs. And chances of a faulty bearing leaving t yard, with burnoff and derailment a possible consequence, a reduced to an absolute minimum.

Servo hotbox specialists will gladly study your requir ments. Why not get together with them soon and blueprint yo own selective maintenance program.

Railroad Products Division

SERVO CORPORATION OF AMERICA • *111 New South Road, Hicksville, L.I., N.Y.* • *WElls 8-97*

**Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857, and 2,963,575. Other U.S. and foreign patents pending.*



SERVOSAFE® Hot Box Detective* systems inspect all passing journals of incoming trains . . . furnish yard crews with advance information on hotbox locations for reliable, economical selective maintenance.



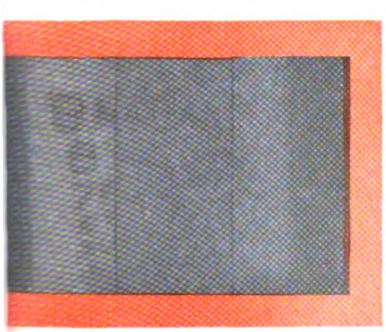
RATH PACKING CO. "Refer" primed, top-coated, and stenciled in one shift—with TUFF Fast-Dry Enamel.

?o Major Coating Advancements for Railroads

:F FAST-DRY ENAMEL
e-day application, automotive-e beauty and durability.

r—an ultra-durable, high gloss enamel em that enables you to prime, top- and stencil a car in 4 to 6 hours. In shift, you can apply a brilliant, automotive-type finish with years of all-weather durability.

TUFF FAST-DRY ENAMEL provides three important advantages over present coatings: It goes on faster. Looks better. Stands up longer. Designed for metal or wood, TUFF Fast-Dry Enamel is ideal for coating or re-coating diesels, cars, track and signal equipment, bridges and buildings.



H GLOSS. *Initial gloss superiority of* TUFF *t-Dry Enamel (left panel) is shown in Kerr Definometer Reflectance test. Middle el is coated with a well-known enamel, lt panel with a leading lacquer.*

TUFF EPOXY SYSTEM
Major breakthrough in chemical-resistant coatings.

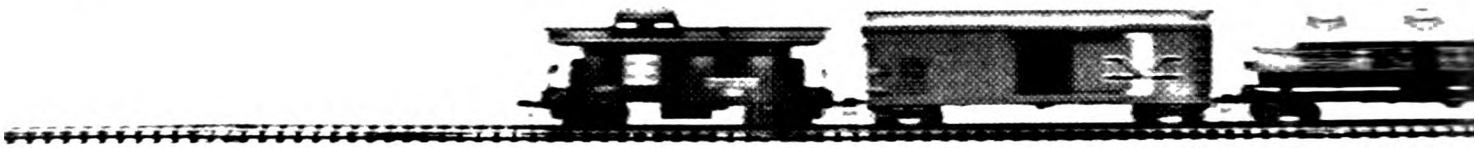
Everybody knows epoxy paints have good chemical resistance . . . but they chalk and lose gloss and color. Now Freight Liner introduces an epoxy system that accents the positive . . . *eliminates the negative.* New TUFF Epoxy retains its glass-like gloss, bright, crisp color, while providing maximum resistance to chemical spillage and atmospheric corrosion.

TUFF gives 800 square feet coverage per gallon, more than that of leading competitive epoxy systems. Mixing and using TUFF is easer, too, thanks to tolerant component ratios (1:1 or 2:1) and long pot life (16-48 hours). Painters say TUFF Epoxy is as easy to apply as conventional one-component paint.

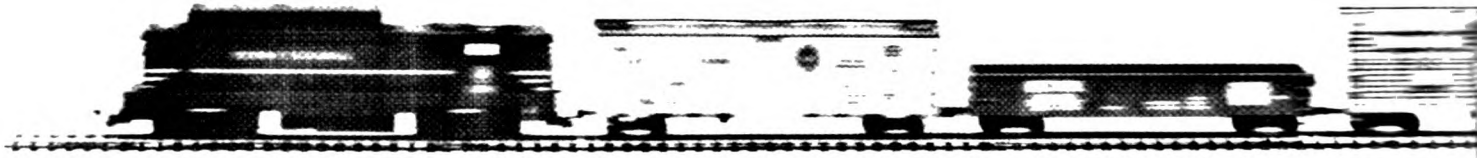
Both of these new TUFF coatings are available as complete systems with rust inhibitive primers. For samples and technical literature, write H. B. FINCH, MANAGER, Freight Liner Products.

ADM Freight Liner PRODUCTS

ADM CHEMICALS
700 INVESTORS BUILDING
MINNEAPOLIS 40, MINNESOTA



IT RUNS AND RUNS AND RUNS AND RUNS...



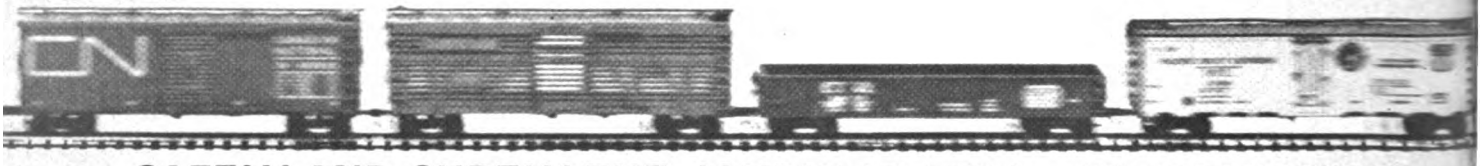
MONTH AFTER MONTH AFTER MONTH AFTER MONTH...



YEAR AFTER YEAR AFTER YEAR AFTER YEAR...



IN SNOW AND RAIN, AND SLEET AND HAIL, AND DUST AND GRIT.



SAFELY AND SURELY THE JOURNALS ROLL—WITH WIKIT® JOURNAL LUBRICATORS

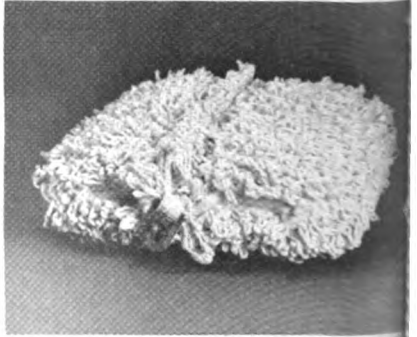
WIKIT is economical to use because of its low initial cost, top performance record and easy, inexpensive renovation.

WIKIT's center wick design provides shortest and most direct oil flow to journal. LOOP-TITE® jacket has interlocking loop pile with high tensile strength. Over-all design assures rapid, multifeed wicking throughout lubricator.

WIKIT's ABSORBenized® treatment provides greatest wicking and absorbency—a special process featured in famous Callaway bath towels.

WIKIT #10 retains over 5 pints of oil after saturation and draining 3 hours. Cores are best-quality nitrile foam—resistant to oil, moisture, heat, compression set. Strong nylon tape secures nonferrous pull handle. Insert either end first, either side up.

WIKIT is the quality lubricator—AAR conditionally approved.



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REPORT FOR MARCH

Automatic Identification Proposed for Freight Cars

To speed the recording of car identification marks, two automatic systems have been developed to meet specifications of the Railroad Action Group, an informal organization of railroad research men under the chairmanship of J. J. Schmidt, assistant director of research, Denver & Rio Grande Western. Both automatic car identification (ACI) systems—one developed by Transdata, Inc., of San Diego, in association with American Brake Shoe, and the other by the Union Switch & Signal Co.—involve the application of special reflecting plates to cars.

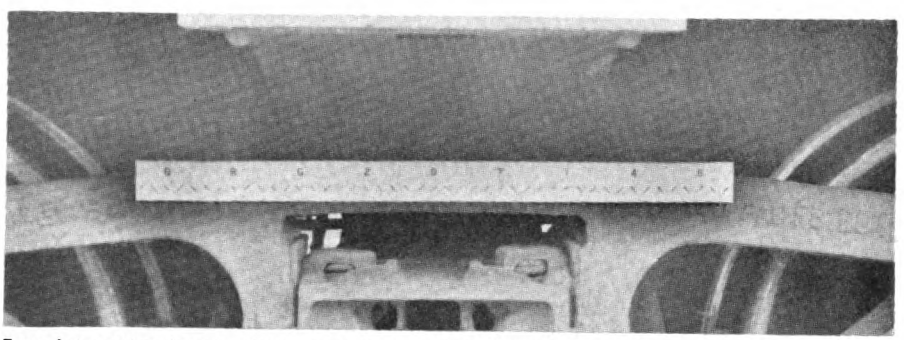
Thirty other systems were designed but did not meet the RAG specifications, among the requirements of which were the following:

- The car identification device must indicate three letters and six numbers and be readily attached, permanently, to any car without interfering with normal functions.
- It must be cheap enough and durable enough to permit permanent installation on the car for less than $5.
- It must operate with trains speeds from 5 to 60 mph.

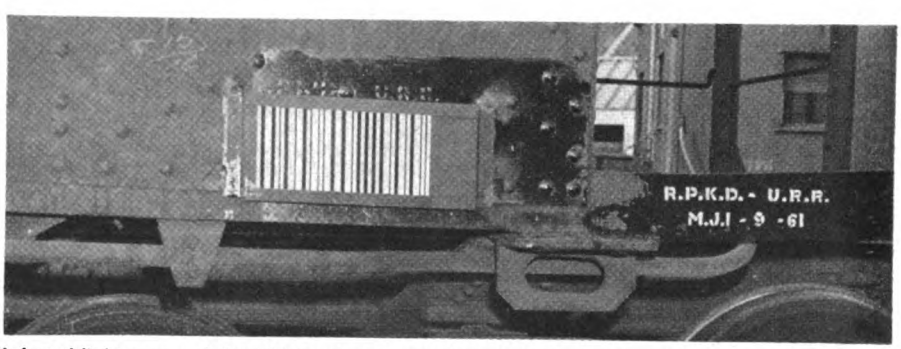
Yard checking alone would not justify ACI, although some savings would be realized. Industry-wide usage of the system, however, would result in two major benefits:

- Per diem settlements could be made on

(Continued on page 45)



Transdata system beams microwave energy at "codeflector" on car from a wayside transmitting antenna.



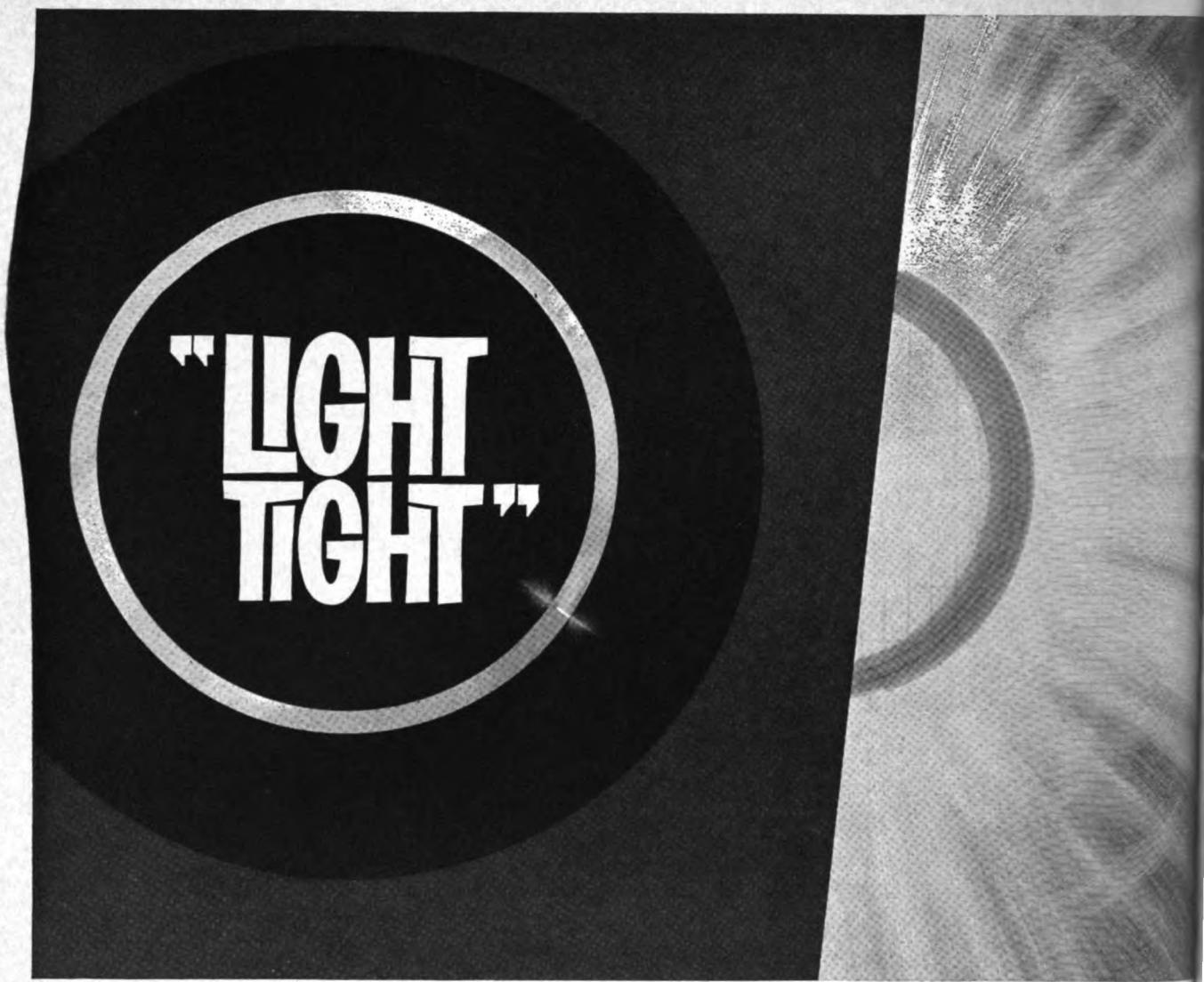
Infrared light source of the US&S system, mounted on wayside pedestal, illuminates reflector plate on car body.

TIME SAVING IDEAS FOR MARCH

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Pedrick® COMPRESSION RINGS REDUCE WASTED POWER

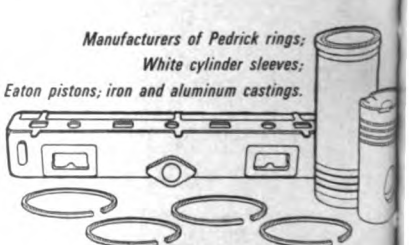
To assure a positive seal between piston and cylinder wall, Pedrick compression rings are "light-tested". This means each ring is placed in a gauge of cylinder size and backed with an intense light. If no light leaks past the face of the ring and cylinder—except at the gap—it has been properly designed and produced.

Light-testing is only one example of how quality is built into Pedrick rings.

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Pedrick rings—positive power for any engine and any type of service. If you have a ring application problem, need a special ring or a Precisioneered® set, write the Pedrick Engineering Department for prompt attention.

Manufacturers of Pedrick rings; White cylinder sleeves; Gillett & Eaton pistons; iron and aluminum castings.



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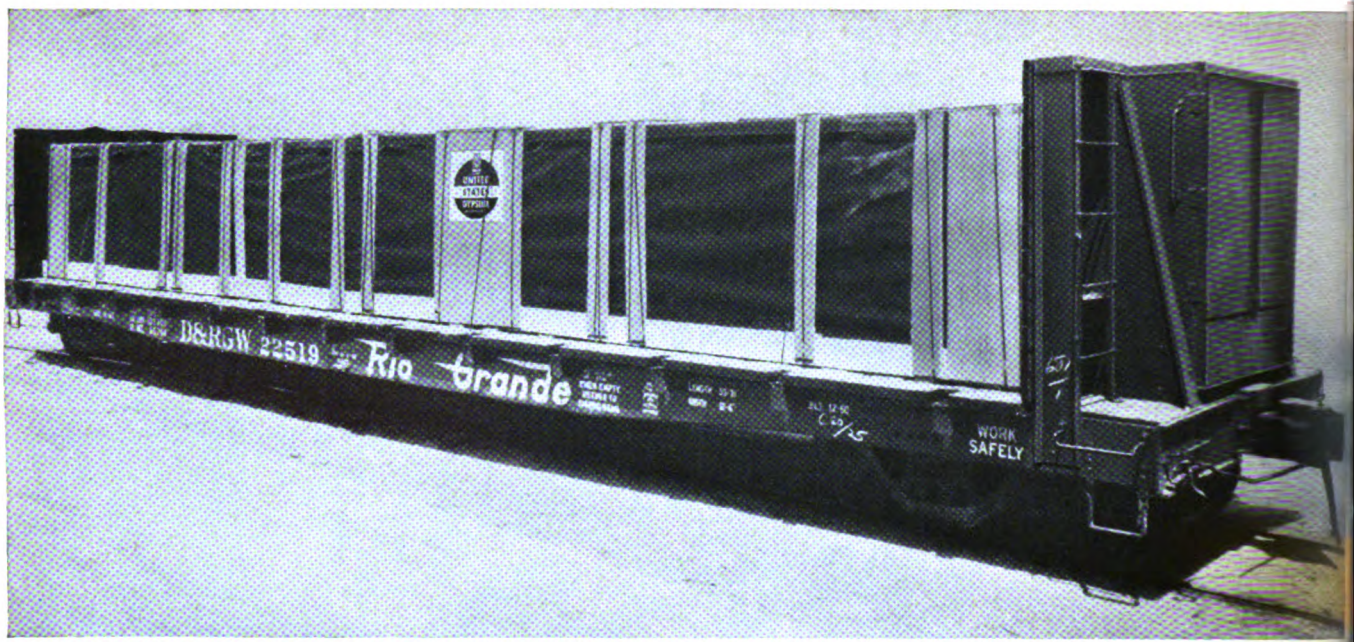
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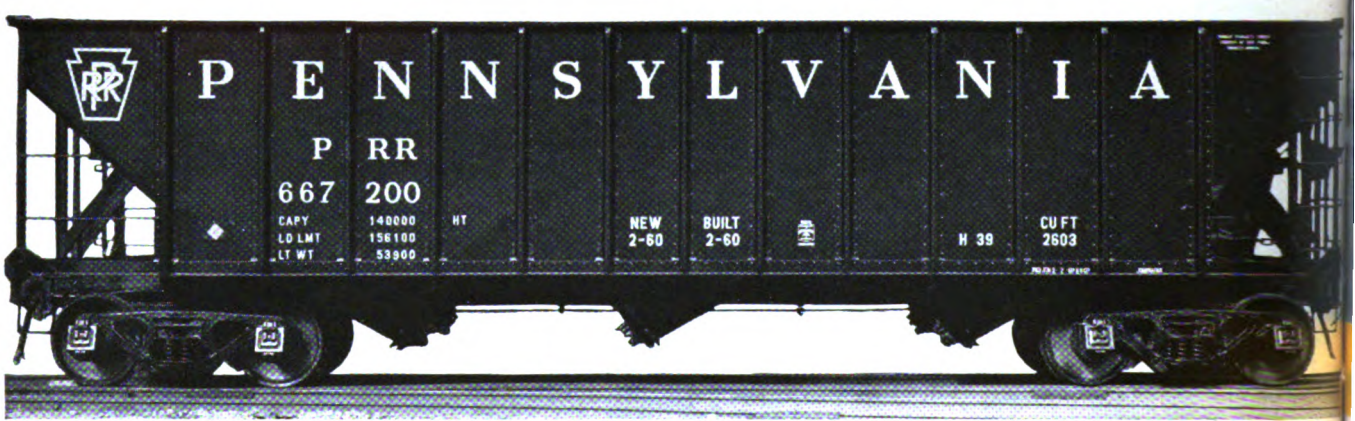
We'll be happy to give you more information about these long-wearing wheels. Just call our nearest sales office or write **Armco Division, Armco Steel Corporation, 1512 Curtis Street, Middletown, Ohio.**

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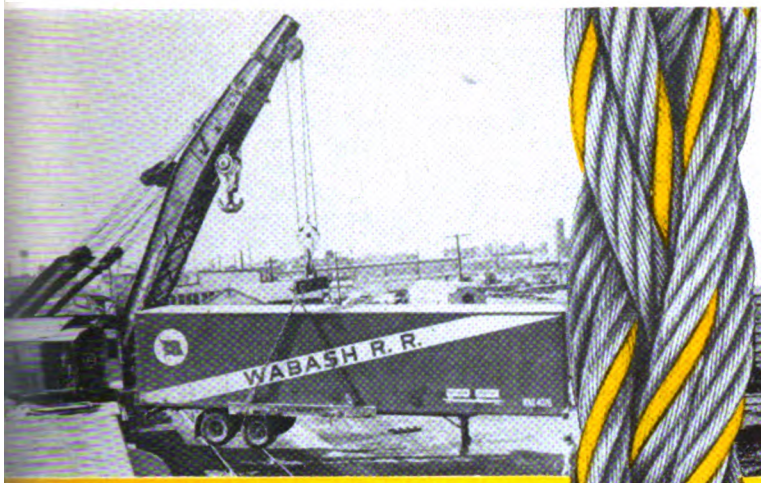
The 70-ton hopper, also built by Bethlehem, combines the advantages of standardization with modern production techniques, and has an anticipated service life of at least 18 years. Bethlehem cooperated closely with the committee of engineers which designed it, and has built it in quantity for the Pennsylvania and two other large coal carriers.

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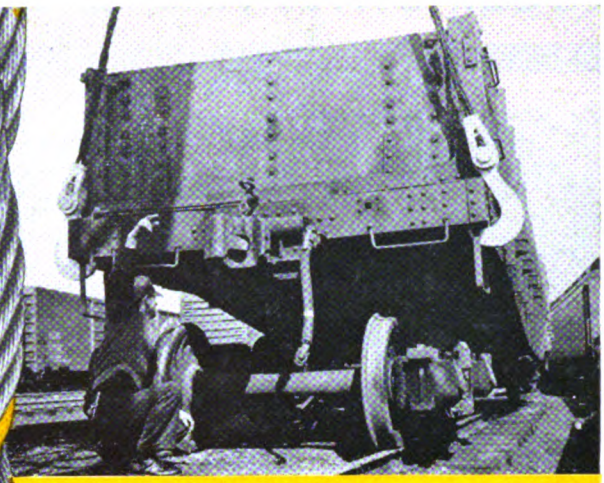
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BETHLEHEM STEEL

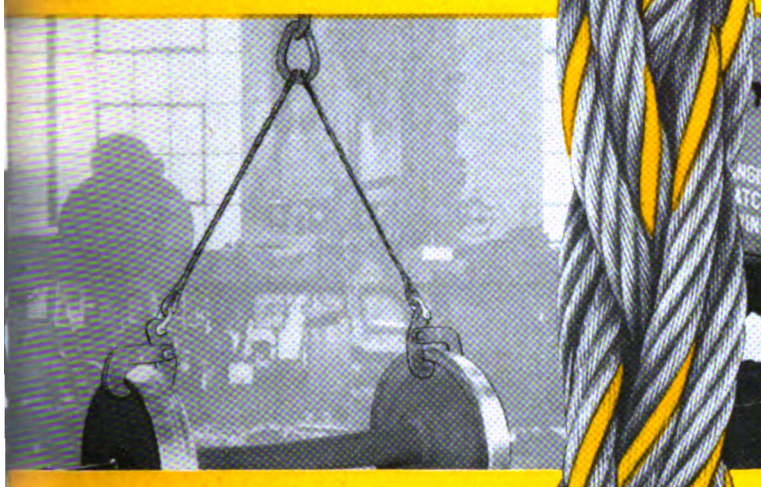
BETHLEHEM STEEL



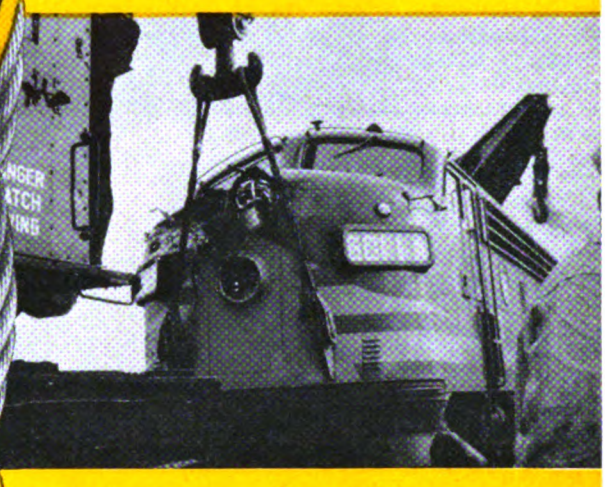
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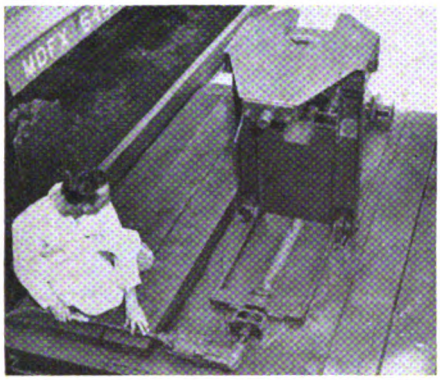


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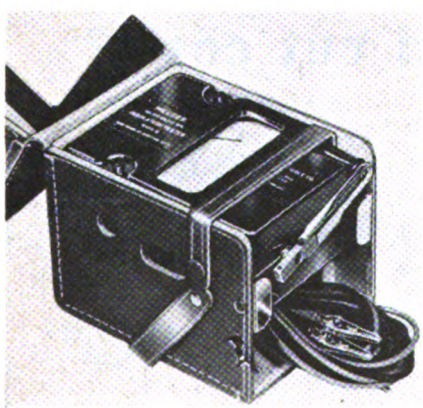
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Piggyback Hitch

Increased cushioning capacity and travel that are said to absorb more than 50,000 ft-lb of impact energy are among the improvements incorporated in a redesigned piggyback trailer hitch. The tie-down, similar to the original product, is a folding stanchion that can be installed on any flat car which can accommodate a trailer load. One man, it is said, can complete the entire tiedown operation in less than a minute, a reduction of over two-thirds in the time previously required. A portable power wrench is used to elevate the hitch and lock it to the trailer king-pin by means of a screw-driven lock-jaw mechanism in the hitch. The hitch support strut, driven beyond the vertical dead-center position against a firm stop, self-locks the hitch in vertical position. An open-lock-jaw permits visual checking of the locking operation when the king-pin is secured to the hitch. The hitch is used principally in pairs on 85- and 89-ft flat cars. American Car & Foundry Div., ACF Industries, Inc.

For more information, circle 3-1 on the coupon on page 50.



Insulation Tester

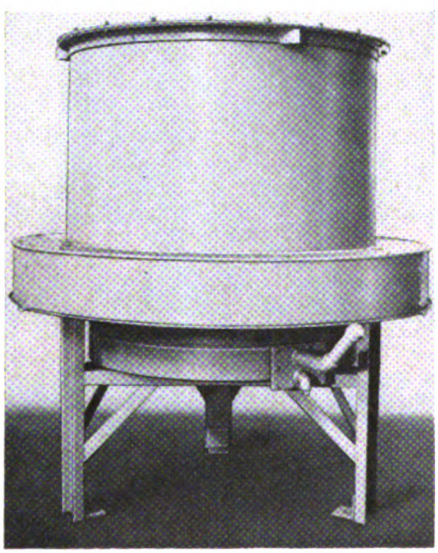
The Mark III Megger insulation tester replaces the Midget Megger tester, although no larger in size. In the new design, because of special limiting features in the circuitry, the output voltage and the reading is kept steady without the need for a constant speed device or a voltage stabilizer. Three ranges of instruments are available: 100 volts d-c, 0.02-20 megohms; 250 volts d-c, 0.05-50 megohms; 500 volts d-c, 0.1-100 megohms. Each also has a double scale and selector switch for 0-10,000 ohms. James G. Biddle Co.

For more information, circle 3-2 on the coupon on page 50.

Diesel Fuel Additive

The detergent action of Ethyl Multi-Purpose Additive - Diesel is said to prevent the buildup of gum and varnish deposits on injector parts, used in average concentrations of only 200 parts per million. According to Ethyl, one diesel fleet averaged 30,000 miles longer injector life on diesel fuel containing MPA-D which is equal to a fuel saving of 0.6 cents per gallon. Ethyl Corp.

For more information, circle 3-3 on the coupon on page 50.



Oil Bath Air Filter

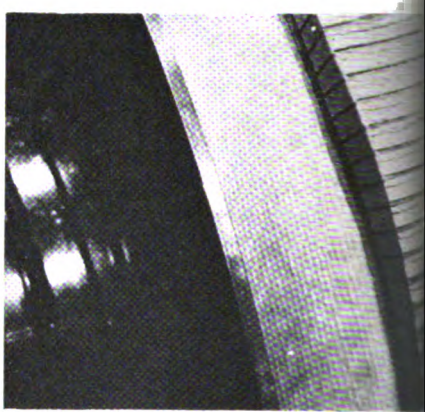
No external power is needed for operation of the Type LP oil bath air filter for engines, compressors, and blowers. The filter is available in eight standard sizes, with air flow capacities ranging from 500 to 20,000 cfm and a filtering efficiency of 99.5% using standardized air-cleaner test dust. Oil level is seen through a sight gage. Air-Maze Div., Rockwell-Standard Corp.

For more information, circle 3-4 on the coupon on page 50.

Hopper Car Lining

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Epoxy Impregnated Glass Cord

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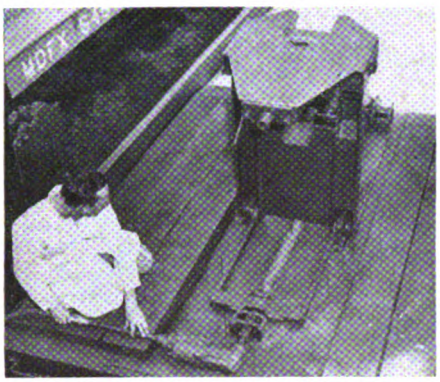
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6. has proved itself on 70 railroads?

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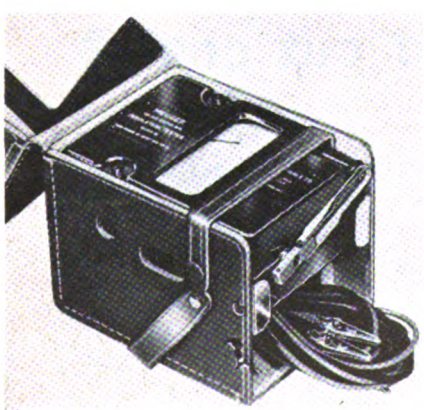
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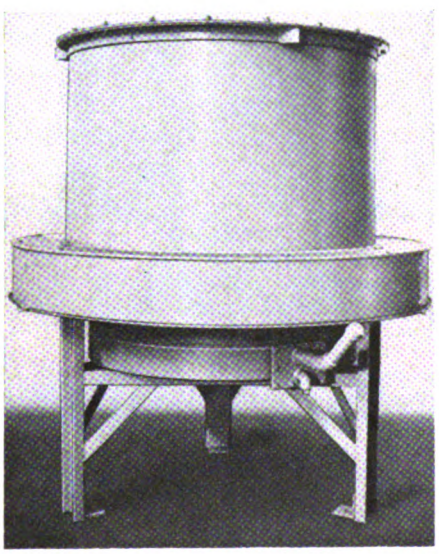
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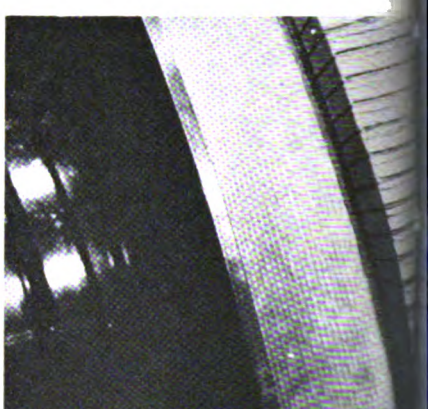
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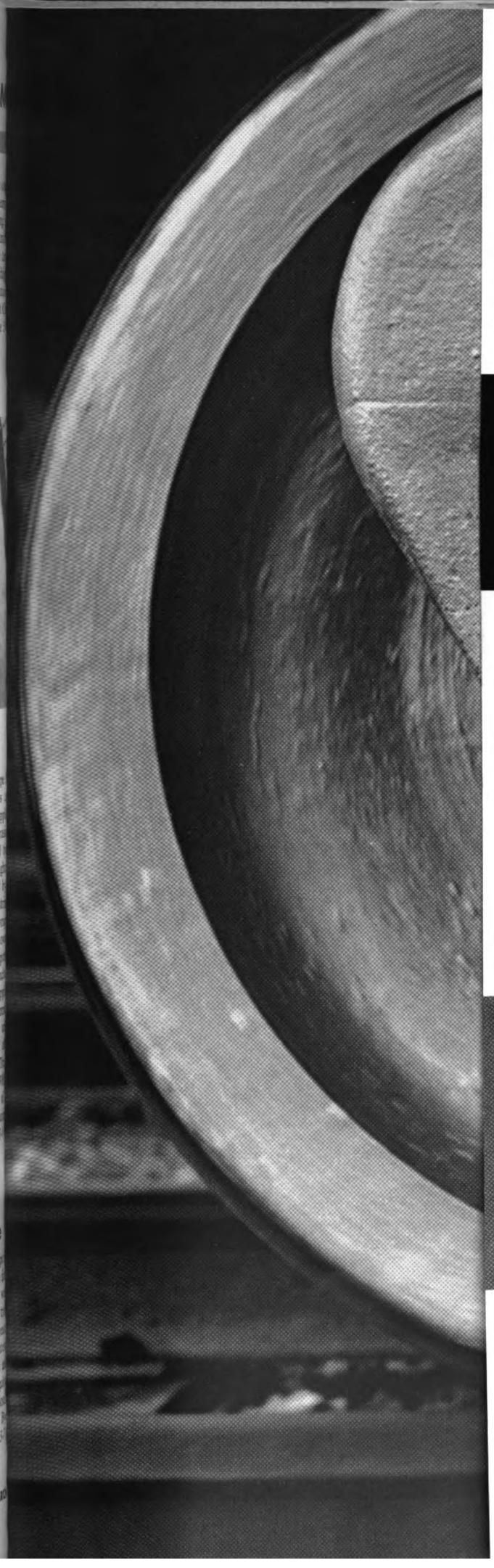
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EDITORIALS

The Convention Combine

With railroad mergers so much in the news, it is not surprising that railroad and railroad supply associations have agreed to combine their meetings and exhibits and hold one giant-size convention October 9-16, 1963, at Chicago. The first of its kind, the convention must be considered an experiment.

For sheer size, the combined meetings and exhibits will outdo anything that these organizations have done in the past. The Atlantic City conventions were probably the nearest approach to a show of this magnitude, and they only involved the AAR Mechanical and Purchases and Stores Divisions and the RSMA exhibits. The 1963 convention will bring together the four Coordinated Mechanical Associations, the Roadmasters, and the Bridge and Building Associations, and four AAR Divisions—Mechanical, Purchases and Stores, Engineering, and Signaling and Communications. Exhibiting will be five railroad supply associations.

One big convention undoubtedly has merit. If it sets a pattern for future exhibits, it may well be an economy measure that reduces exhibit costs of supply companies, costs that indirectly must be absorbed by the railroads. And it does a public relations job for the railroads, with the exhibits scheduled to be open one day to the public, it could be worth while.

At the same time, however, one big convention introduces real problems for each of the railroad associations. These associations have a purpose. They have work to do. This publication has worked with and served the mechanical department associations ever since there were mechanical departments, but we are sure that our experience applies to all departments. Both timing and attendance are important to the mechanical department associations. A late convention could delay important decisions, possibly for a year. With both the Mechanical Division and the Coordinated Associations meeting within a few days of each other, the attendance at both annual meetings will probably be adversely affected. It is doubtful that the railroads can permit key officers and supervisors to be absent from their duties during the entire convention week. The success of both meetings is dependent on the contributions of these men at the sessions of both the Mechanical Division and the Coordinated Associations.

As an experiment, we hope the combined convention and exhibits are a success, and we will do our utmost to make it so. We will evaluate it after the "dust has settled" in mid-October 1963.

Another Way

When the Electrical Section AAR was dissolved, many of its members felt that their work of years had come to naught. To be sure, a Committee on Electrical Equipment-Rolling Stock has been appointed, but it could scarcely be expected to perform the functions of 18 committees supported by a paid secretary.

It has been suggested that the Land Transportation Committee of the American Institute of Electrical Engineers take over for the railroads and the recent annual meeting of the Committee indicates that there may be some advantages of doing it this way. Twelve papers were presented, five by railroad authors, one by joint railroad-manufacturer authors, three by manufacturers, and four were contributions by European engineers. Most of the papers dealt with current railroad problems and some went into their subjects quite intimately.

For example, one report dealing broadly with the use of epoxy resins as applied to insulating systems of traction rotating equipment, tells how one railroad is using them to extend service between rewinds (RL&C, Feb. 1962, p 7).

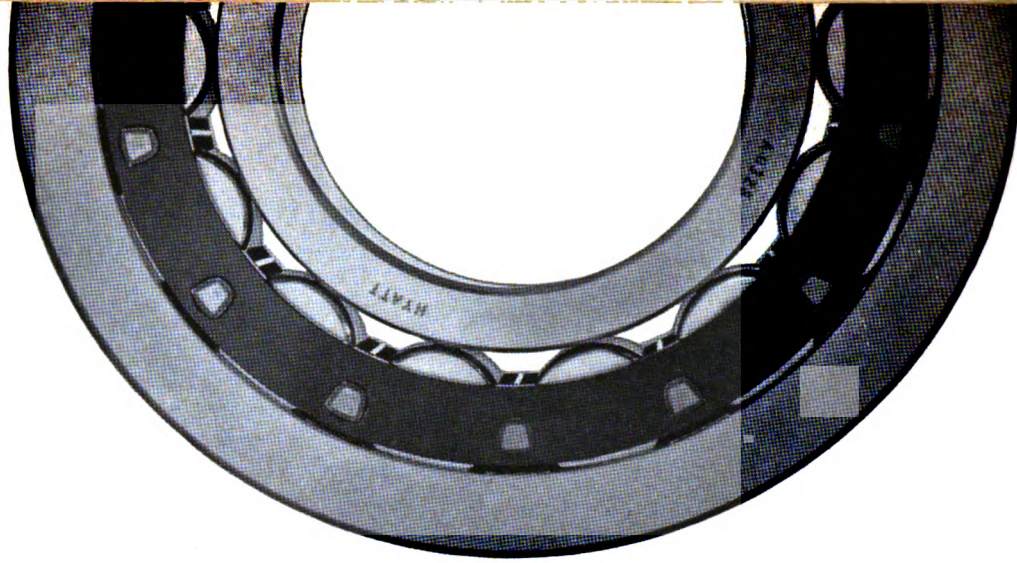
Without any attempt to endorse or condemn the procedure, this example is offered to show how railroad problems may be and are handled by organizations outside of direct railroad jurisdiction. Actually a number of the same men who were active in the Electrical Section have performed almost the same functions for the Land Transportation Committee.

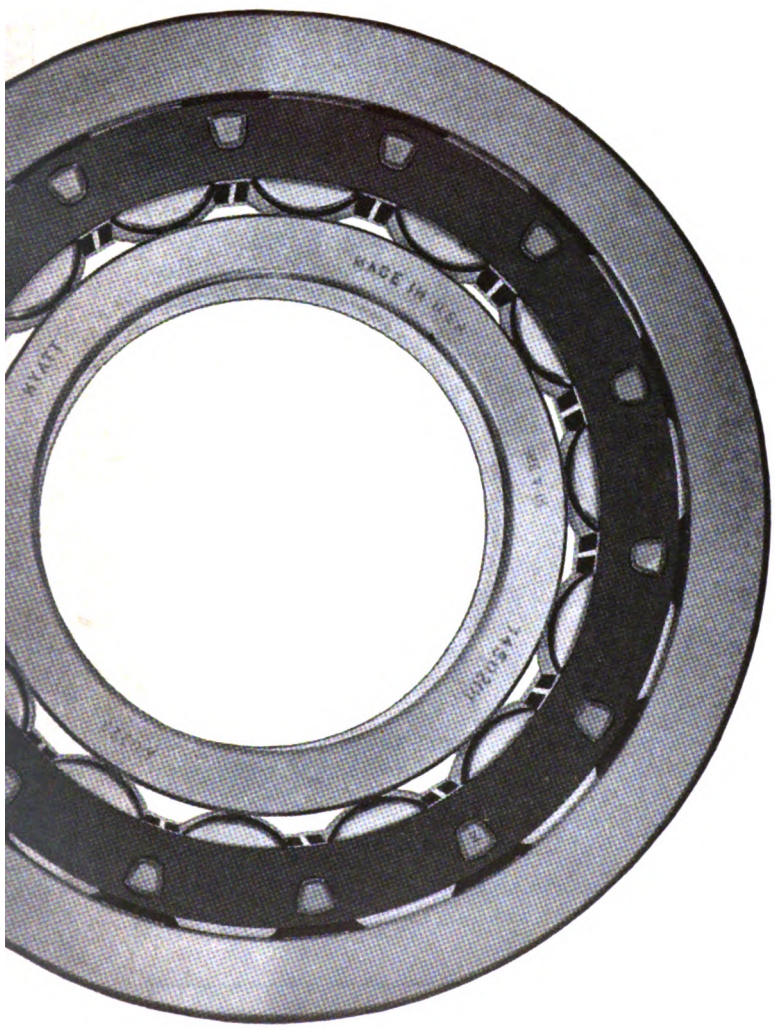
Whatever may be the disadvantages of carrying on railroad department committee work this way, it does offer several advantages. The direct cost to the railroads is reduced, and attending members have the advantage of becoming acquainted at the same time with all new developments in the electrical industry. The annual meetings of the Land Transportation Committee normally are covered in a two-day period. The Committee also, at a different time, holds annual joint meetings with the Railroad Division of the American Society of Mechanical Engineers for mechanical men who have electrical problems and conversely. Local Section meetings and the literature of the Institute are also available to AIEE members.

The success of carrying on this way is dependent upon one thing. And that is that those who sanction membership and who endorse attendance at meetings permit the participation of men on their own staffs. There is probably no easier or quicker way for them to keep abreast of what is going on in an industry which contributes so much to what we do and how we do it.

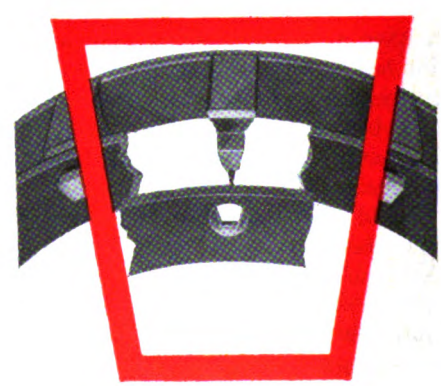
1962 Meetings

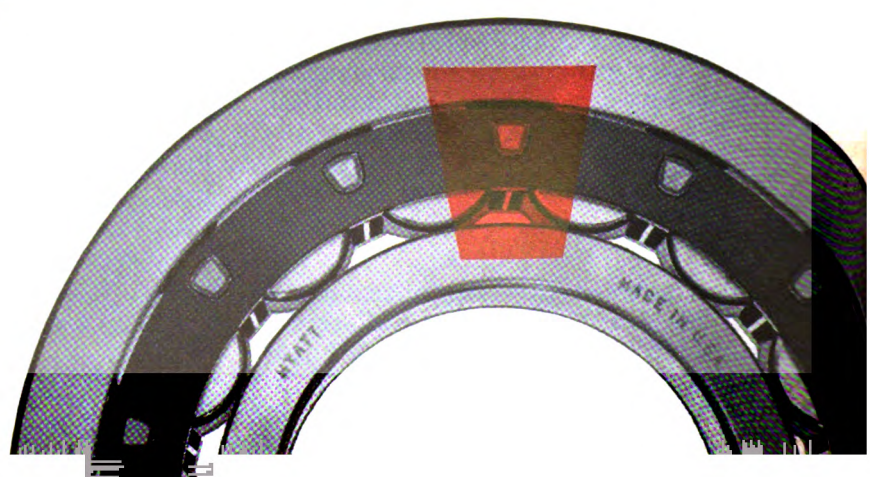
Let's not forget that regular mechanical department meetings are being held this year. The Mechanical Division meets June 26-28 at the Hotel Sherman, Chicago. The four Coordinated Associations meet September 13-16 at the same place. These meetings are important. Make your plans to attend now!





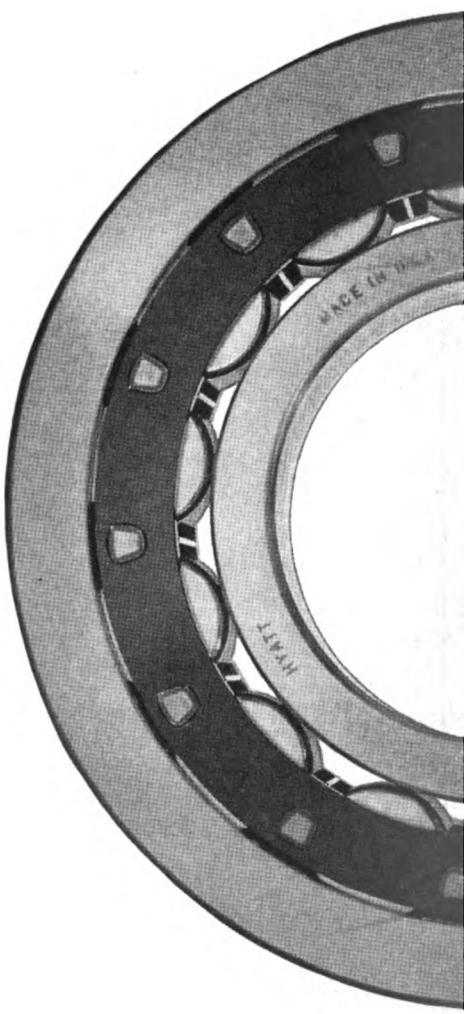
14 Trapezoidal shaped trunnions unite with end rings to form a twist-proof cage





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1. **CURRENT PERFORMANCE DATA**
   Freight cars equipped with solid bearings and lubricating devices now average only one set-out per 850,000 car miles. That's only one set-out per 54.05 car years.
2. **CURRENT SOLID BEARING OPERATING COST**
   Labor and material maintenance for solid bearings with lubricators now costs $40.86 per car per year, compared to $82.15 as determined by the AAR in 1955.
3. **COMPARATIVE ECONOMICS OF SOLID VS. ROLLER BEARINGS**
   The entire annual cost of *owning and operating* a solid bearing car with lubricators in freight service averages $11.85 *less* than the cost for just *owning* a roller bearing car.

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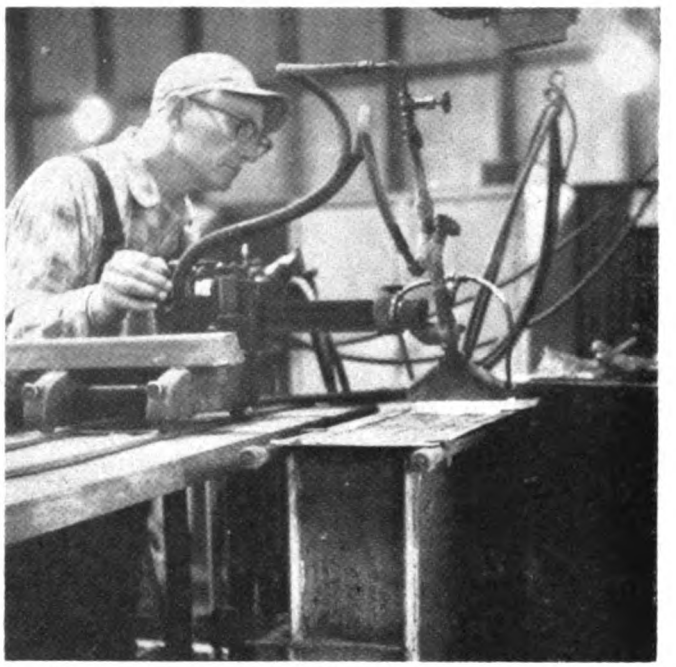


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ıtor headers are prepared at one of two tinning stations.



Movement of flame header melts solder evenly around tube ends.

ıilwaukee Line Repairs Radiators

Various types of heat exchangers from cars and locomotives are overhauled on production line

nproved diesel locomotive radia- repair facilities at the Milwaukee, ., shops of the Milwaukee have e possible greater production since were put into operation a year

With line production methods extensive use of roller conveyors shop-built repair equipment, six turn out an average of 10.2 radi- s per day at a cost of $12.66 each one-shift operation. Another em- ee assigned to the radiator opera- an hour daily brings carbody roofs radiators in place to the repair and moves the roofs to and from nearby wash rack.

adiator repairs were formerly e in the car shop, about one-quar- mile from the locomotive back). The work force, averaging ten, ıded one man who spent three 's daily in moving radiators be- n the locomotive and car depart- ts. Output averaged 9.1 radiators y at a cost of $21.56 each.

An important step was the relocation of the repair facilities in the locomotive back shop. While some of the units overhauled in the radiator shop do come from passenger cars, the bulk of the work involves the cooling-water radiators for the Milwaukee's locomotive fleet of approximately 800 units. The new shop has been completely tooled to make possible low cost overhaul and repair.

Radiators from the erecting shop come to the repair line in place in the roofs from carbody type locomotives, or as separate banks from road switcher units. Initially, a carbody roof is placed on a pair of wheeled work tables having sloping tops to position the radiator banks for easy handling. Two machinists disassemble and assemble radiators at this position. After a roof is removed, it is sent to a nearby cleaning area where large locomotive components can be handled. The radiator banks are disassembled into individual sections which move by roller conveyor to the radiator shop's specialized cleaning area. Cleaning areas and tanks are located on a low concrete platform which is sloped to give rapid drainage.

Surface dirt on radiator fins is removed by a mixture of steam and air blown through the radiators under pressure from a Sellers hydraulic jet cleaner. Radiators are then placed vertically in a rack holding seven to thirteen sections, depending on their size. The loaded rack is placed in an air-agitated cleaning vat containing an alkaline detergent which passes up through the tubes. After removal, radiators are blown and rinsed with a mixture of steam and compressed air from a second Sellers jet cleaner.

At the "rodding" position, each radiator is mounted in a jig which holds it 6 in. above the concrete platform on which all cleaning and inspections are done. A soapy water solution is poured

through the tubes to lubricate and loosen remaining deposits. With the section elevated in the jig, a light is placed underneath to show the plugged tubes. These are the only ones which are "rodded." Past practice was to pass a rod through all the tubes, but the inspection light has made this overall cleaning procedure unnecessary.

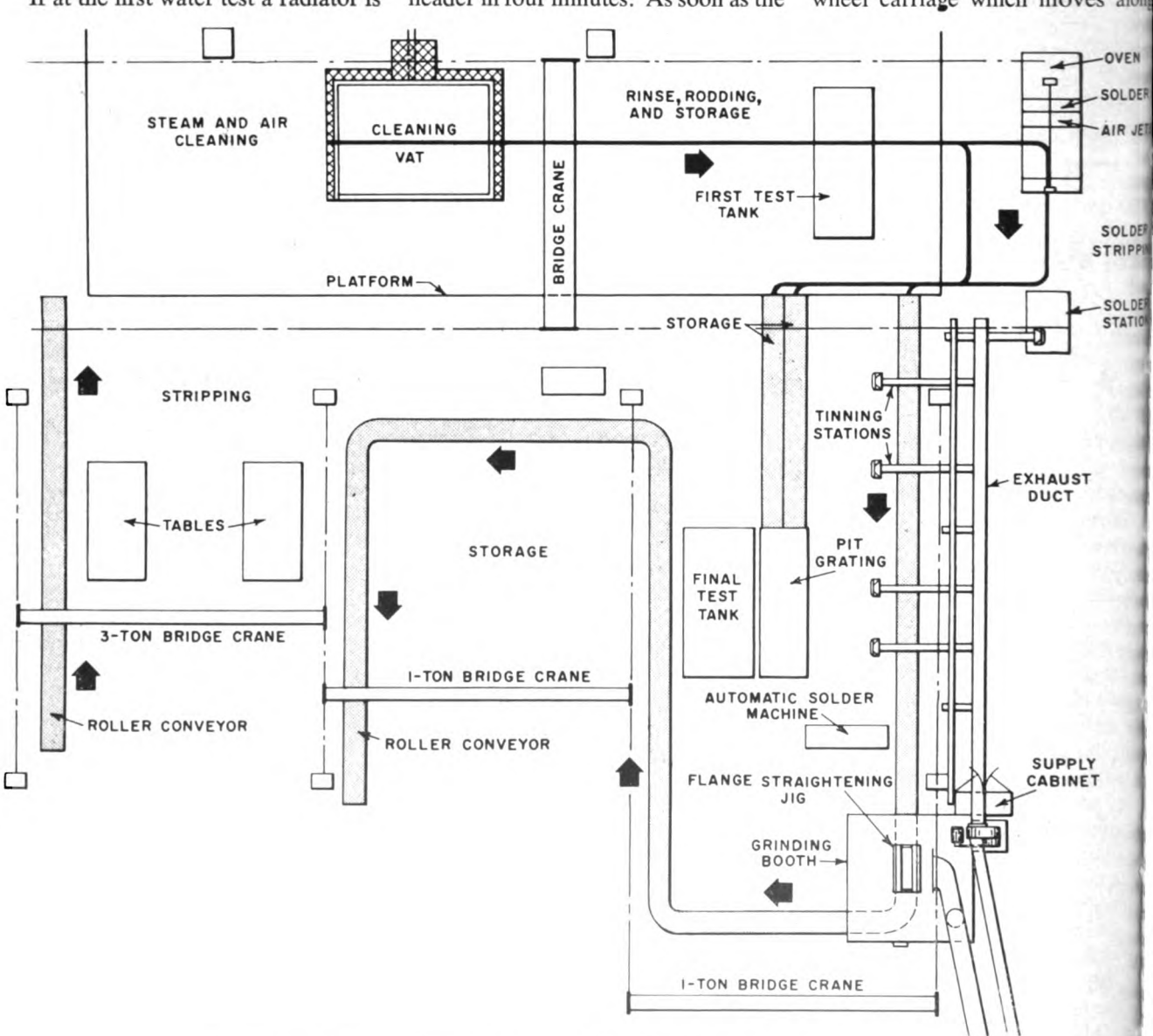
After "rodding," the radiator is placed in the first water test tank. If there are no leaks, the radiator moves on a through conveyor to the grinding booth. After the radiator is placed in a turnover jig there, contact surfaces are polished and flanges straightened. A roller conveyor then transfers the radiator to the next position where fins are straightened with a metal comb, and a tube expander is run over the tube ends to restore full openings. The radiator is then moved to storage area opposite the rebuild tables.

If at the first water test a radiator is found to leak, it goes to the solder removal area where solder on the headers is melted so bent or damaged end frames can be removed and replaced. End frames are reconditioned on a nearby work bench. Instead of the usual 40/60 solder mixture, silver solder is used to apply these end frames because it has better holding qualities and is unaffected by subsequent repairs.

Prior to removal of old solder from the tube ends, the radiator is placed on a preheat platform to remove all moisture before being transferred to the adjacent molten-solder bath. An air-operated hydraulic manipulator clamps the radiator so it can be turned 180 deg, making possible the dipping of both ends in the molten bath, with no manual handling. The molten bath removes all old solder from a 4-in. header in two minutes and from a 6-in. header in four minutes. As soon as the solder is removed, the tube, ends, a header are wire-brushed to rem slag and oxidation. Manual clean is to be superseded by an automa fixture in which air jets will do t cleaning job.

After solder removal, the radiat are stored on a double-row conve adjacent to two tinning stations. E station is equipped with water, air, a gas connections. A mixture of p dered lead and acid flux is applied the header before tinning. Tinnin a manual operation, with each tinn position having an output of three four radiators in eight hours.

The radiator then moves to the tomatic soldering jig for application new solder. The jig, made from Oxy-O-Graph machine formerly u in the boiler shop, replaces six man soldering stations. The flame prod ing equipment is mounted on a fo wheel carriage which moves along



Radiator repair facilities at Milwaukee shop have been laid out to produce smooth flow of components.

ck beside the radiator turnover jig. ıall bars of solder are laid in the ader between the tube ends. After iquid flux is brushed over the bars, : flame head is moved by hand from e end of the radiator header to the ıer, gradually heating the solder rs until they liquify and seal the tube ds.

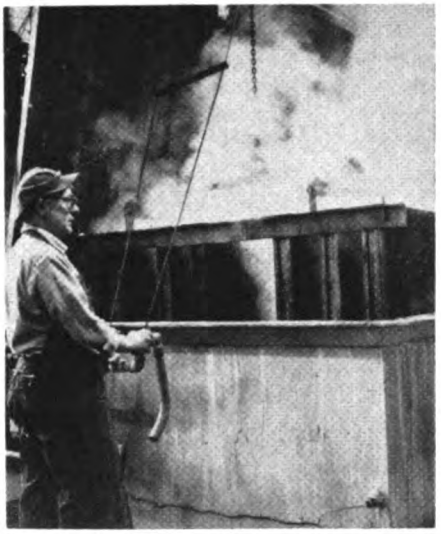
To prevent solder leakage where ɔes fit into header, the tubes are oled by compressed air fed through les drilled along the top of a ¾-in. ɔe which is placed just under the diator flange. To replace this air oling, individual water tanks will on be installed so that radiators can immersed to within 1 in. of the top ıge during the automatic soldering ocess. The flame used for the autoatic soldering is wide enough to ver not only the soldered area, but so the radiator flanges. Annealing ese flanges makes it easier to restore eir original flatness. Two to three diators can be processed in eight ɔurs in the automatic soldering unit.

The mechanized soldering proced-e is used for repairing leaks at heads. When tubes develop leaks at ɔints between the headers, up to)% can be sealed by soldering.

After the soldering is completed, the diator moves to the grinding booth ıd next station for the same polishg and straightening operations perrmed on radiators that pass the first ıter test. The resoldered radiator is en placed in the final test water tank. OK, it is moved to the storage area. 'ith the equipment and procedures ɔw used, it is seldom necessary to turn a radiator for resoldering.

Actually, the repair line is arranged provide a backlog of defective radiors at two key positions, tinning and ɔldering. This makes it possible for :pair personnel on the line to be asgned part time in the back shop with-ıt significant reduction in radiator ıtput. Milwaukee officers expect furıer cuts in radiator overhaul costs hen planned improvements are made t several points along the line.

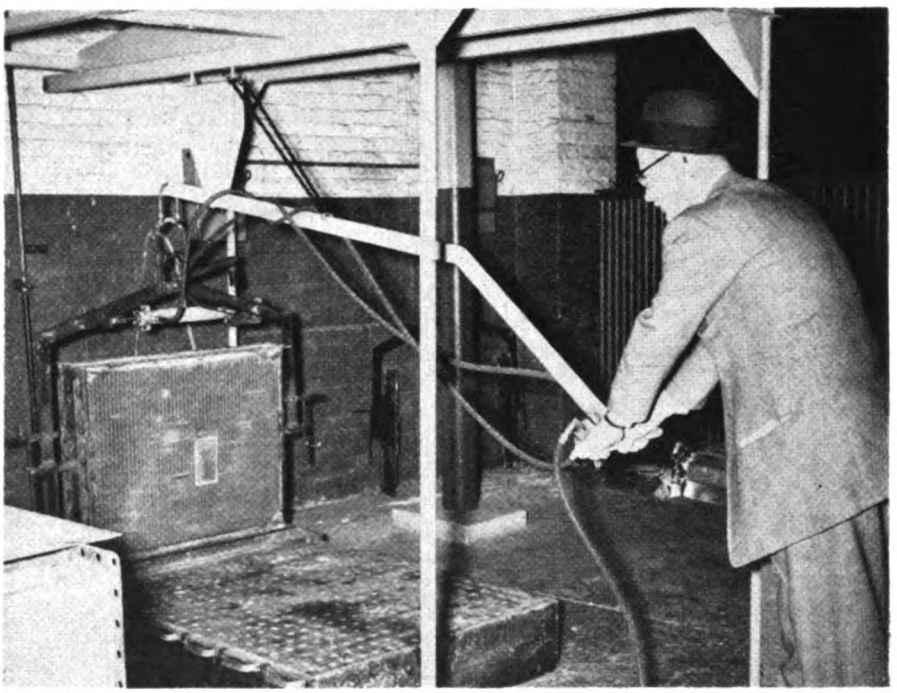
Locomotive oil cooler cores are rocessed on the production line. At a ench near the cleaning vat, repairs are ıade to miscellaneous heat exchangrs such as locomotive cab heaters, aircompressor intercoolers, radiators for Vaukesha under-car power plants, nd the evaporator and condenser coils rom passenger-car air-conditioning quipment.



Air agitation forces alkaline solution upwards through tubes during 24-hr cleaning period.



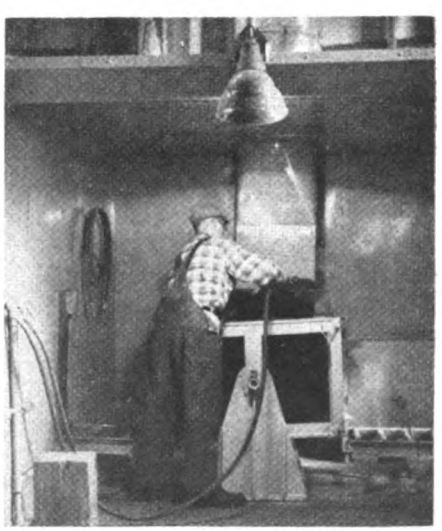
A light placed under section elevated in jig shows plugged tubes which are rodded.



Preheat platform with radiator held in reversible clamp for dipping ends in molten solder bath. Control handle keeps operator away from solder spatter if moisture remains in radiator.



Tube expander restores full opening in tubes.



Booth where flanges are straightened.

RRs Must Improve Existing Cars

New freight equipment cannot be installed rapidly enough to meet the increasing demands of shippers

By H. M. Wood

Assistant chief mechanical officer-car, Pennsylvania

Many of us are giving more time and effort to the design of new freight cars than to the improvement of the existing freight car. While it is necessary to plan for new types of freight cars, we must also give a reasonable amount of time and effort to the improvement of the existing freight car.

We should not lose sight of the fact that freight car ownership in the U. S. and Canada totals slightly more than 2 million cars. The average age of these cars is 18.4 years. If, in the future, we do not build new freight cars any faster than we have in the past ten years, it will require about 32 years to completely replace the freight cars in existence today.

We must provide the industries which we serve with freight cars that will carry greater loads, will give better protection to ladings, and will move from origin to destination with less delay en route because of mechanical failures.

There are three methods of obtaining improved freight cars. One is to convince the shipper that he should own or lease new equipment specially designed to meet his requirements. The second is for railroads to build new freight cars at a much higher rate than they have been able to finance in the past ten years. The third is to make further improvements on existing freight cars so that they will more nearly meet the growing requirements of shippers.

Some shippers are giving considerable thought to acquisition of new freight equipment to meet their particular needs. Very recently, traffic and mechanical representatives of five eastern railroads met with traffic officers of a large steel producer to review and analyze a gondola which this shipper expressed an interest in having built to handle heavy loads of semi-finished steel from the plant where it is now being turned out as a finished product to another plant where finished rolling can be done at less cost. A revenue haul for railroads of over 400 miles is involved. The shipper expressed a desire to handle 140 tons of payload per car. This load could have been handled over several of the railroads represented at this meeting but the cost would have been between $40,000 to $43,000 for a single car that would have a light weight of approximately 93,000 lb, using high-tensile steel. From this conference came an agreement that the interested railroads would form a Mechanical Committee and advise the shipper the largest capacity car that could be economically justified. It is anticipated that a car of 90- to 95-tons capacity will be recommended, the cost of such a car being in the neighborhood of $17,000 to $20,000 and the weight of the car being approximately 66,000 lb, again using high-tensile steel.

A number of railroads and private car owners are presently building 50-ft insulated box cars equipped with hydraulic cushioning devices, roller bearings and load restraining equipment to meet the requirements of one of our major shippers, whose products must be moved in closed cars and be provided with maximum protection from lading damage. It is estimated that these insulated box cars will cost from $18,000 to $19,000 to build.

The requirements of the majority of shippers will not be as demanding as these two examples, but it can be anticipated that there will be a great need for improved freight car equipment in the very near future. It is doubtful if sufficient new freight cars can be secured in time.

Greater Capacity

The first and probably most important requirement is to provide greater carrying capacity in existing freight cars. Railroads and industries are formulating new rate schedules based upon incentive rates. Incentive rates call for higher minimum loading and lower rates per ton mile, which means that both existing and future freight cars must be able to carry increased payloads.

Some progress is now being made by the AAR to provide for increased loading for existing freight car equipment. As the result of letter ballot action taken during the third quarter of 1961, a 5% increase in load limit of all freight cars has been approved. A number of railroads were not in complete agreement with a 5% increase in the load limit of freight cars, resulting in agreement that the 5% increase would become effective as soon as the Interchange Rules could be strengthened to insure that the new load limits would be observed. Modification of Interchange Rules to provide this protection is now in process. Should the recommendations of the Special Committee appointed by the General Committee of the Mechanical Division be approved by the General Committee, modifications will be submitted to letter ballot to become effective August 1, 1962.

There are other factors that should be given consideration in order that maximum loading can be obtained with existing freight cars.

The present black collar axle, now AAR standard for use with solid bearings, has reached its maximum capacity and these axles should not be loaded beyond the new limits which will become effective August 1, 1962. This statement is made based upon the axle records maintained for many years by the Test Department of the Pennsylvania. For years it has been PRR practice to subject every dismounted freight car axle to a Magnaflux test, using the wet method. Over the years, 8 to 10% of all axles examined contained cracks in the wheel seat and 25% of these axles had to be scrapped because the cracks could not be eliminated by turning the wheel seats. The large majority of axles scrapped for this cause were 6 x 11 axles.

The railroad industry should consider promptly the need for an improved freight car axle so that there can be a further increase beyond the contemplated 5%. This development should be progressed by the AAR in conjunction with axle manufacturers.

It would be advisable for railroads to review the design of existing freight cars. Underframes and bodies of a large part of the 600,000 freight cars

lt in the last ten years can handle reased loading with little or no engthening, provided their trucks equipped with a new design of axle t will permit utilization of existing ck side frames and bolsters. If nec-ary, larger capacity trucks can be plied.

About two years ago, the PRR built 000 freight cars, among them a up of 50-ton, 50-ft cars scheduled automobile industry service. When se cars were designed, an under-me of greater than 50-ton capacity s specified so that these cars would ve greater capacity if required in the ure. This was done with slight in-ase in the light weight of the car. ently, automobile manufacturers ng these 50-ton box cars requested t the PRR furnish cars of greater pacity. Slight modification of male ter plates and application of 70-ton cks have permitted us to meet the ppers' requirements without build-new cars. We have another group 50-ton box cars, turned out of our ps about three years ago, that the tomobile industry has requested be placed with 70-ton box cars by Au-st 1, 1962. New box cars will not required. Strengthening of bolsters d cross bearers and application of -ton trucks will make these cars suit-le for handling the required loads. Very recently, a sand shipper re-ested our railroads to provide some pper cars capable of handling 100 s of sand. We have no 100-ton pper cars, but the latest 70-ton hop-r cars were designed to carry excess pacity and the bodies and under-mes will adequately handle the 100-n load. We will need a 6½ x 12 ck with either 36-in. or 38-in. eels. Truck manufacturers are re-ewing the slope sheet clearance and expect they will provide an accept-le truck application.

These examples illustrate the in-easing demand for greater loading. e know that similar requests have en made to other railroads and be-ve that such requests will increase as affic departments push their efforts return freight business to the rails.

While working upon increasing the rrying capacity of freight cars, it is cessary that we recognize the need insure that increased loading does t seriously affect rail life. In the past, aintenance-of-way problems usually ad no direct bearing upon the think-g and action of the mechanical de-artments, as far as freight cars were concerned. It is now necessary that mechanical departments recognize that there is a definite relationship between freight car design and rail life and take action to see that improvement in freight equipment is compatible with sound rail-load requirements.

The Mechanical Division has recognized the need for some restriction in rail load by requiring that all new freight cars of over 70-tons nominal capacity and up to and including 100-tons nominal capacity, should be equipped with steel wheels of at least 36-in. nominal diameter. While the permissable load per inch of wheel diameter for the higher capacity cars does not meet the recommendations of the AAR Joint Committee on Relation between Track and Equipment, it does provide for some reduction in rail stresses as compared with the 33-in. wheels with which cars of over 70-tons nominal capacity were equipped prior to January 1, 1961.

Improved Cushioning

The second requirement for improvement of existing freight cars is improved energy absorption. Humping operations and longer freight trains, both of which are economic necessities, increase the need for better control of damage to the freight car and its contents. We are all familiar with progress made in building new cars with hydraulic cushioning devices. The small number of new cars so equipped does not begin to meet the needs for this type of equipment. Similar devices that can be applied to existing freight cars at reasonable cost and provide good protection for 10 to 11 mph impacts should be developed promptly.

You will recall that the first new hydraulic cushioning devices applied to new cars provided for a 10-in. travel, followed shortly by designs offering a variety of travels up to and including 30-in. In the race to produce greater travel, there has been a tendency to forget that the 10- and 12-in. travel produced excellent results. It is not my purpose to fight the battle of long travel hydraulic cushioning devices on new cars, but to call attention to the fact that we need to do more constructive work on providing a device that will do a good job on our existing freight cars.

Review of hydraulic cushioning devices to date indicates that the longer travel hydraulic cushioning devices will provide very good protection to car and lading for impact speeds up to 11 or 12 mph, depending upon the length of travel. It has also been determined that 12-in. travel cushioning devices will produce practically the same reduction in coupler forces for impact speeds up to 10 mph.

The railroads need to do something for the existing freight car that will permit them to take advantage of the properties of the cushioning devices without having to completely rebuild the existing car. Several attempts have been made to reach a solution, but it is felt that more can be accomplished.

The least expensive and simplest device to apply to existing cars consists of a straight steel tube extending between draft gears and so arranged that when a coupling impact occurs, both draft gears are engaged to cushion the shock. Its value is dependent upon the draft gears and will provide better protection to the car and to some commodities at impact speeds up to about 7 mph. Another device presently available is a hydraulic shock absorber in each end of the car in the general location of the conventional draft gear. It has 7 or 9 in. travel. Again, this device is limited in its effectiveness, providing better protection to the car and some commodities at impact speeds up to about 9 mph. A third manufacturer has produced an experimental sliding center sill with 24-in. stroke hydraulic shock absorber that will fit into the existing center sills on freight cars. It appears to have considerable merit and theoretically will provide good protection to car and lading for impact speeds between 11 and 12 mph.

Preliminary investigation indicates that it may be feasible to develop a hydraulic draft gear with a 12-in. stroke in place of the standard draft gear. Such a device could be installed in existing cars and would provide protection to car and lading up to 10 mph. The total increase in car length would be about 1½-ft. Many of the leading draft gear manufacturers have not as yet indicated their interest in the development of hydraulic draft gears. It would be to their advantage to do so.

Trouble-Free Service

The third requirement for existing freight cars is to improve their mechanical condition so that loaded freight cars will move over the railroads with a minimum delay due to

(Continued on page 26)

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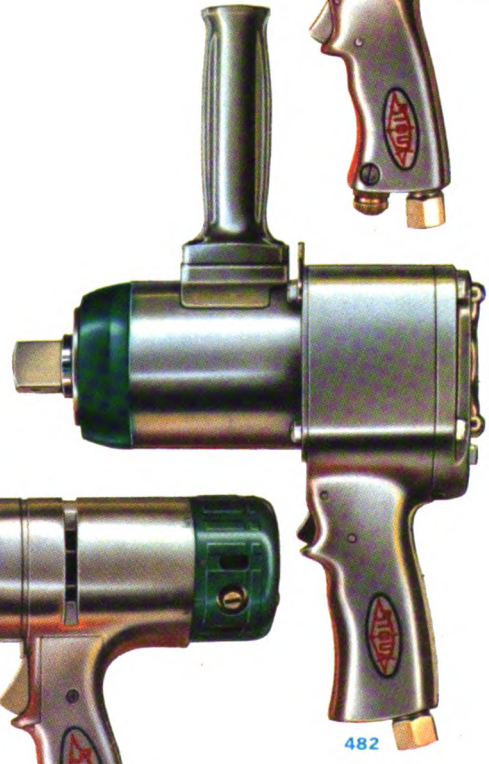
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RRs Must Improve Existing Cars

(Continued from page 23)
mechanical failures. These improvements are necessary for certain parts of the freight car truck assembly. Better wheel performance is a must. Recent action by the AAR, which will provide for the orderly elimination of the cast iron wheel will meet this requirement. As a result of letter ballot action in 1961, cast-iron wheels will not be manufactured for use on interchange freight cars after January 1, 1964.

This letter ballot action also established a tentative date of January 1, 1968, for the elimination of all cast-iron wheels on freight cars in interchange service. If cast-iron wheels are removed from service when condemned under the present interchange rules, it is anticipated that this target date of January 1, 1968, will be met, since wheel-shop records show that the average life of cast-iron wheels today is approximately five years.

The design and metallurgy of the present wrought-steel and cast-steel wheels will provide good wheels to meet increased loading of freight cars and contribute to fewer mechanical failures and out-of-service time for freight cars.

Solid Bearing Journals

Probably the most important part of the freight car truck which affects the reliable performance of freight cars is the solid-bearing journal box assembly. There is probably no other part of a freight car that has received as much attention or produced as many experts with widely divergent theories. There is still much to be done.

I would like to take your time to review briefly the history to date:

In 1952 the AAR Board of Directors advised the General Committee of the Mechanical Division that definite action should be taken to improve the freight-car hot-box situation. A study, conducted by two highly competent research groups, led to the proposed mandatory application of lubricating devices which was submitted for letter ballot in 1956.

A compromise starting date of August 1, 1957, was selected and the Interchange Rules were modified but not without considerable opposition from a number of sources.

The date when all interchange freight cars were to be equipped was set for January 1, 1960. This has been set back until it is now May 1, 1962. This appears to be a realistic date since analysis made during the second and third quarter of 1961 indicated that approximately 96% of all serviceable cars would be equipped by January 1, 1962, and that the remaining 4% serviceable cars could be equipped in the first four months of 1962 without hardship to any car owner or shipper.

It took the railroads just one year too long to equip all cars with lubricating devices. Had many of us realized the benefits to be obtained when more than 75% were equipped with lubricating devices, we would have moved faster.

This history on the PRR is interesting. In 1957 we had 16,000 hot boxes and our average hot-box mileage for the year was 145,600 miles. In 1961 we had 3,800 hot boxes and our average hot-box mileage for the year was 513,000 miles. In November and December 1961, and again in January 1962, we produced better than a million miles per hot box, a figure that we have never approached in the past. Only 43% of our hot boxes in 1961 occurred on cars equipped with lubricators. This history and these facts are cited for only one reason—to show how long it took to effect a worthwhile improvement.

There are other improvements necessary in the solid-bearing journal-box assembly to further improve hot-box performance and produce more reliable freight car performance.

The next important step is to reduce the fore-and-aft movement in this journal-box assembly. There is sufficient information available to the railroads today for them to come to a decision soon as to how this is to be done. Two methods are presently available and both will provide the necessary improvement.

Both methods cannot become AAR standards. This subject should be resolved quickly by the railroads and a planned program for elimination of fore-and-aft movement in journal boxes should not be subjected to the same delay that affected the application of lubricating devices.

It is recommended that car owners give consideration to the mandatory application of flat-back bearings rather than journal stops. There are a number of reasons for this recommendation.

Over 10,500 freight cars are in service or are programmed to be equipped with flat-back bearings. Performance of these bearings to date has been excellent.

The present cost of equipping a freight car is less than the cost of applying journal stops. If the car owner can provide the scrap brass to permit flat back bearings to be manufactured without additional brass being furnished by the manufacturer, application of flat back bearings for 6 x 11 journals can be made for $25 per car including reworked wedges. When only the "I" type bearing is returned for conversion, the bearing manufacturer must provide 92 lb of make up metal, and the cost per car for 6 x 11 size is then about $50. For 5½ x 10 bearings the cost is less. This compares favorably with $70 for the cost of journal stops applied in place.

When quantity production is made possible through increased demand, these bearings can be produced for the same cost per pound that obtains today for the AAR standard "I" bearing. The figure of $25 additional per car where purchaser furnishes necessary scrap material, will be reduced to $15 per car and the figure of $50 per car where the additional brass is furnished by the brass manufacturer, will be reduced to approximately $39 per car.

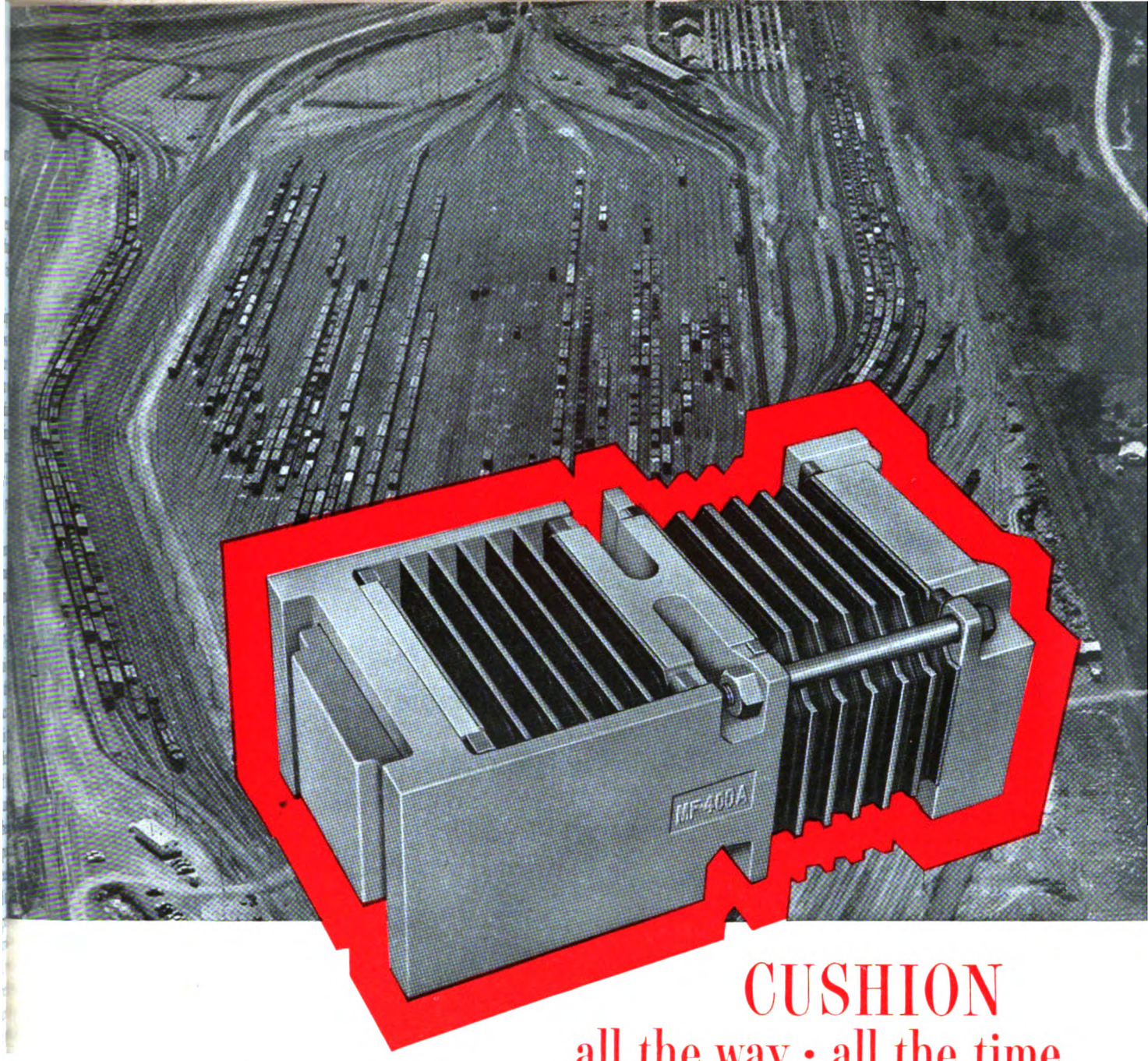
There are presently four manufacturers of journal stops and none of the stops is interchangeable. One standard piece of equipment will provide better compliance to mandatory requirements, less inventory and easier initial application.

When a method of containment of fore-and-aft movement in solid bearing journal boxes is adopted, the application of rear seals to journal boxes can be actively progressed. At the present, there are many designs of rear seals for freight car journal boxes, all too highly priced for the job they do.

When fore-and-aft movement is restricted, the industry should be able to produce a rear seal at a reasonable price that will give protection from dirt and water, as well as eliminate oil loss through the back of the box.

The development and application of lubricating devices was the most important step in the improvement of the

(Continued on page 42)



CUSHION
all the way • all the time

National MF-400A Draft Gears

A.A.R. Specifications M-901D-59

- Protects car structure against damaging impact forces.
- Provides high reserve cushioning capacity.
- A.A.R. official* rated capacity 30,460 foot-pounds at 500,000 pounds reaction force.
- Reserve capacity up to maximum of 71,000 foot-pounds.

National Rubber Draft Gears in service over 15 years!

- on all types of freight cars
- on passenger cars
- on diesel locomotives
- on all types of mine cars
- on mine locomotives
- on industrial cars

and are still providing outstanding cushioning to all types of rolling stock under most severe operating conditions, whether freezing cold or in tropical heat.

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HERE'S WHY:

1. Metal brake shoes can take the heavy load needed to remove ice.
2. Metal shoes condition the wheel so it can remove ice faster. Result: Metal shoe cars consistently function quickly under all conditions.

For dependable braking in any weather specify METAL brake shoes by American Brake Shoe Company. They are engineered to take it and give more braking for your brake shoe dollar.

AMERICAN Brake Shoe COMPANY

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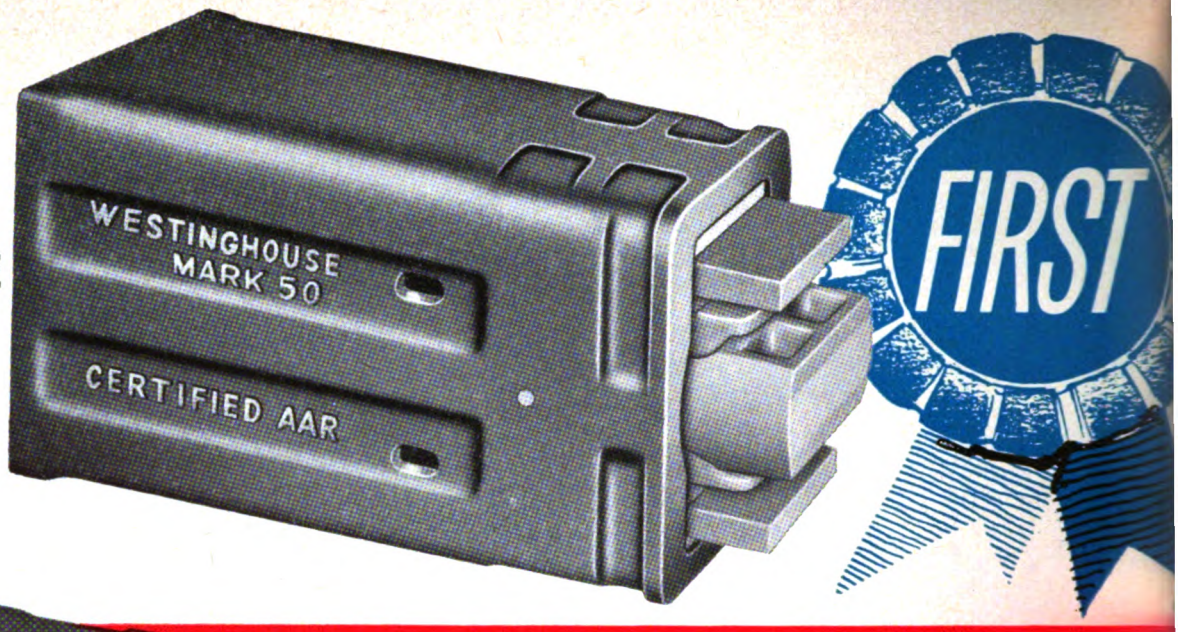
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A.A.R. CERTIFICATE NO. 41





R. CERTIFICATE NO. 42

*A.A.R. Specification M901E-59 Requires High Capacity (36,000

These two were the first of *any type* draft gears to meet A.A.R. Specification M901E-5 for standard 24⅝-inch pockets!

Characteristic of Cardwell Westinghouse Company leadership... *first* the friction-ty MARK 50! Then (another *first*) the combination friction-rubber MARK R500 Dra Gear was tested and A.A.R. Approved with these amazing results:

MARK R500 official capacity is 44,000 foot-pounds at Rating Trav (500,000 pound RFL)... average capacity, after endurance and sturdine tests, was 54,500 foot-pounds at Maximum Travel (800,000 pound RFL**

(**) RFL—Reaction Force Level

RICTION GEAR TO MEET A.A.R.
SPECIFICATION M901E-59 *

VESTINGHOUSE MARK 50

FRICTION-RUBBER GEAR TO
MEET A.A.R. SPECIFICATION M901E-59 *

WESTINGHOUSE
MARK R500

nds Minimum) at Low Reaction (500,000 Pounds Maximum)!

u have a choice! *Both* of these HIGH CAPACITY Westinghouse type gears exceed
A.R. requirements with tremendous amounts of reserve capacity. Friction type, or
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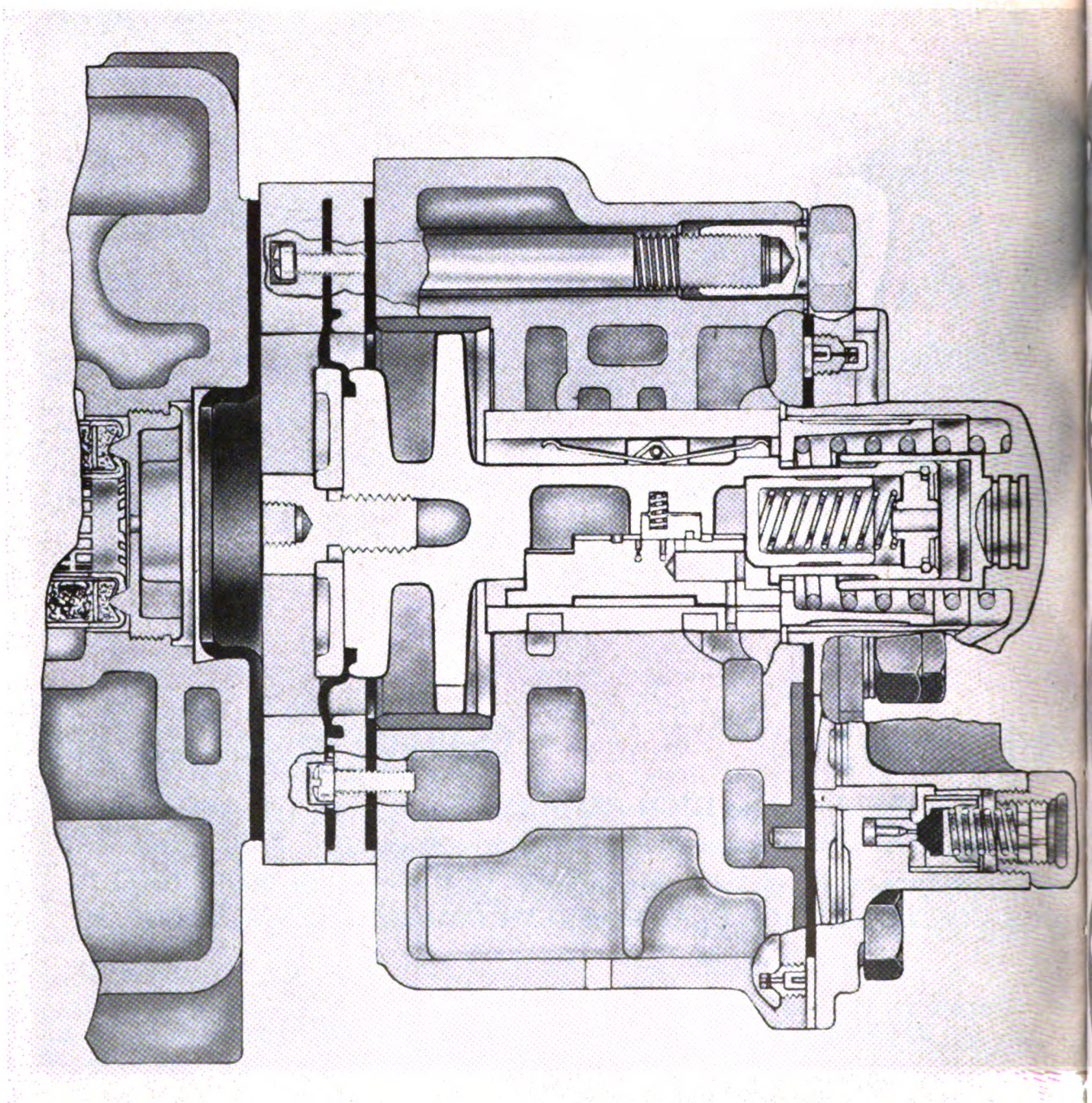
AB Valve Modified with Diaphragm

Rubber diaphragms have been in service on many air-brake devices for several years. During this time, techniques of design and manufacture have advanced to give the current high degree of reliability. Where they have replaced ring-packed pistons, the effectiveness of rubber diaphragms has been especially noteworthy because of the elimination of variable leakage past piston rings.

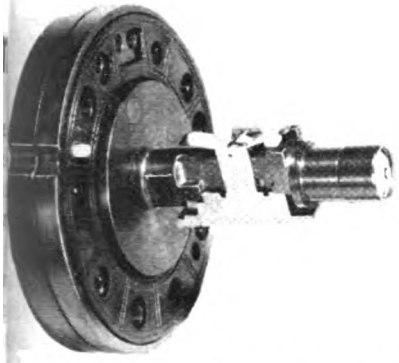
Air-brake manufacturers now have developed a method of incorporating a diaphragm piston in the AB valve service portion. Permission has been granted by the AAR Mechanical Division for service trial of up to 7,500 such portions on interchange freight cars. Carmen probably will be encountering these modified valve portions with increasing frequency in the months ahead.

One of the chief features of the diaphragm piston, its total elimination of ring-packed-piston leakage, exten the release reliability of the AB valv It eliminates leakage as a cause fo stuck brakes, particularly on the re ends of long freight trains.

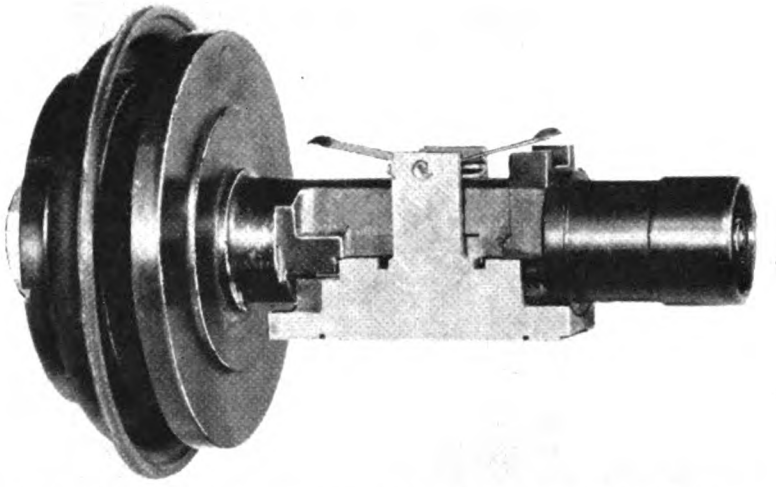
Another important factor that en courages use of the diaphragm pisto is the economy it makes possibl Piston-ring fitting is eliminated, bus ing tolerance on wear is wider befo truing is required, and the bushing c be used beyond present condemni



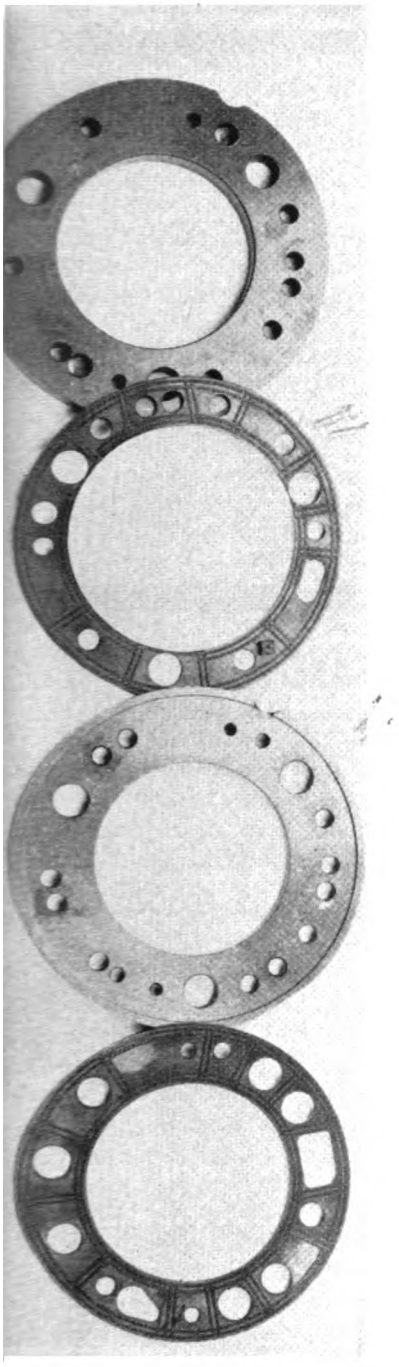
Diaphragm piston is installed in original service portion body following application of two filling pieces which are permanently installed. Fillin pieces are part of the modified valve and are removed with it if it is necessary to substitute conventional AB portion.



assembly for diaphragm piston makes pos-
e the conversion of the standard AB valve
the ABC-1 valve. Three reach nuts, not
wn, are included as part of the kit.



Diaphragm piston replaces original ring-packed piston in the service portion.



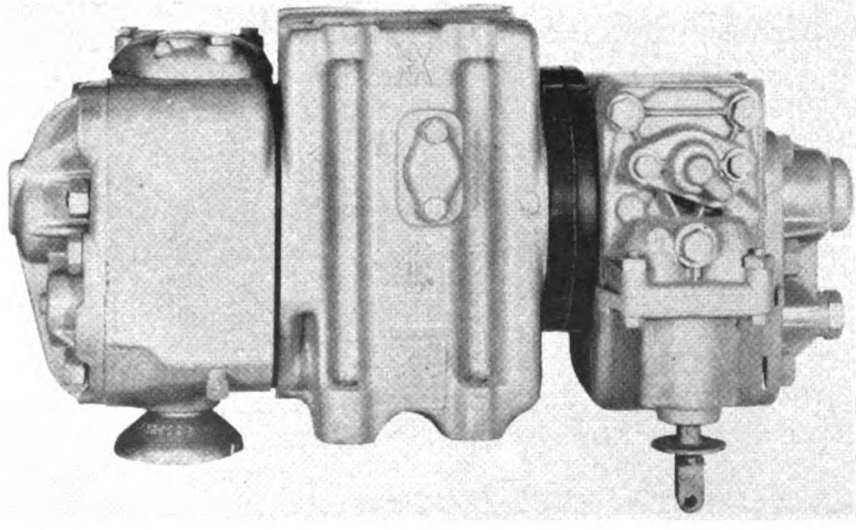
filling pieces, gaskets, and attachment
ws are used for modification of valve.

limits. In addition, outmoded service portion bodies without filter-protected charging chokes can be reused following application of the diaphragm piston.

The diaphragm of the piston assembly is clamped between the two faces of the filling piece which, in turn, is secured by the attachment screws to the pipe-bracket face of the service-portion body. This body is then applied to the pipe bracket with standard studs and reach nuts. A kit consisting of the diaphragm piston with slide valve and graduating valve and the two filling pieces with gaskets and attachment screws is furnished for applications made in railroad repair shops. A fixture is available for drilling and tapping the pipe bracket face of the service portion body for the attachment screws. Existing mounting studs are retained, and the three reach nuts supplied compensate for the increased thickness with the filling piece.

Converted portions are tested on present AB test rack using a slightly modified test procedure and test plate. When applied on the standard AB pipe bracket with the standard emergency portion, the valve designation becomes ABC-1. The filling piece and three reach nuts which hold the service portion on the pipe bracket studs are part of the converted service portion and remain with it when removed from the pipe bracket. Those failing in service can be replaced with standard AB service portions.

If a converted service portion fails to pass the single car test, the AAR suggests that service representatives of the air-brake companies be present during the rack test and disassembly of the failed valve. Failed parts and information as to the cause of failure should be sent to the Mechanical Division.



Modified AB valve is recognized by $1\frac{7}{32}$ in. thickness of filling pieces installed between pipe bracket and service portion. Emergency portion is not involved in the conversion.

EDGEWATER WROUGHT STEEL WHEELS RUN 22.5% MORE MILES—CAN SAVE YOU

$89.60 PER CAR

Simple arithmetic verifies this superiority made possible by denser, tougher wrought steel:

Average life of a one wear wrought steel wheel..... 306,000 miles
(Average freight car travels 17,000 miles per year. Average life of wrought steel wheel is 18 years, according to service records of a major class I U. S. railroad.)

Cast steel wheels last about..... 250,000 miles
(According to a verified published claim, based upon actual tests, by a United States manufacturer of cast steel wheels.)

EXTRA mileage in wrought steel wheel..... 56,000 miles

HERE'S WHAT WROUGHT STEEL WHEELS CAN SAVE YOU

It is true that you can get a cast steel wheel for $60.50, and that the mill price of a wrought wheel is $62.00.

Therefore, you may think you are saving $12.00 per car on cast steel. But consider these facts:

Initial cost of a wrought steel wheel (mill price)..... $62.00
Wrought steel wheel cost per mile..... $ 0.0002
($62.00 ÷ 306,000 miles average life)
Net saving in favor of a wrought steel wheel..... $11.20
(Cost per mile × 56,000 miles extra)

Savings per car (8 wheels)..... $89.60

IF YOU BUY WROUGHT STEEL WHEELS, YOU GAIN $89.60 WORTH OF WHEEL LIFE PER CAR!

Put your money in the better wheel and the mileage payoff will show up in the profit column. Our nearest representative can give you more detailed information.



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GN Develops Safe Induction Heater

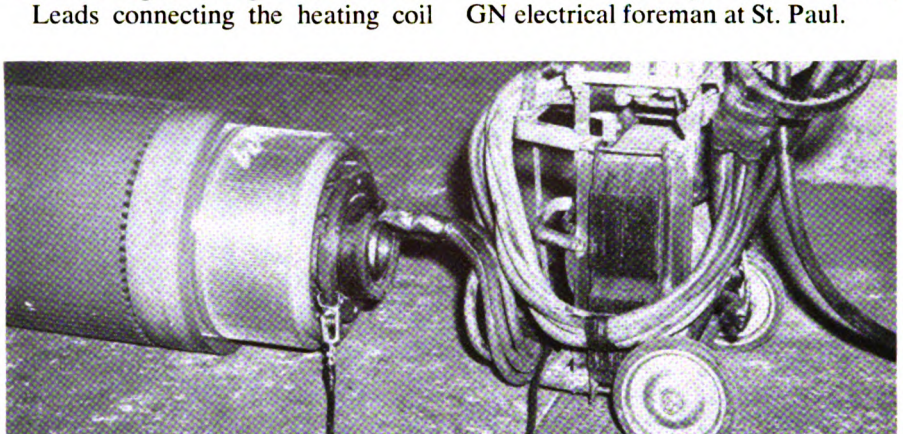
Application and removal of the inraces of traction motor armature rings has been simplified through use of the Great Northern's new v-voltage, shop-built induction ater at the road's Dale street shops St. Paul, Minn. Time required for noval of the commutator end inner e is approximately 20 sec. Removal the pinion end inner race is done in sec. No cooling-off period is necesy after the heater is operated. Safety ards have been minimized because operator is isolated from the 440t coil operation.

The standard induction heater merly used was designed to operate 440-volt, single-phase current. Up 90 sec was required before the race l heated sufficiently so that it was e of the shaft. Although good ination and silicone varnish were used the heater, the induction coil bene extremely hot and required a ling-off period between successive s. Heat shortened the insulation , and insulation breakdown became gerous because of the high voltage. In the new heater, a second-hand 25 a transformer core rewound for 440 ts primary and 15 volts secondary used. The primary is wound with 3 turns of 0.125- x 0.375-in. rectgular copper conductor (60,000 cular mil area). The secondary has turns of three 0.025- x 1-in. rectgular copper conductors in parallel. is copper was salvaged from an old 1D traction motor field coil. The mary circuit requires approximately 5 amp at 440 volts when the pinion l heating coil is used, and 100 amp 440 volts when the commutator end ating coil is used.

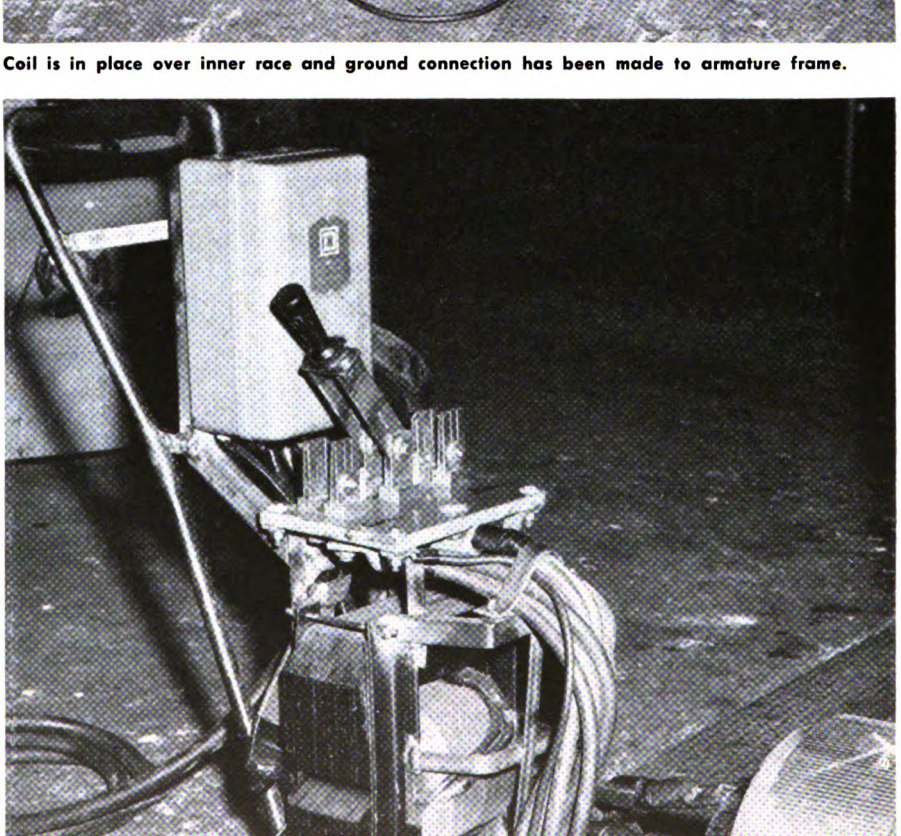
The pinion end coil is formed of ir turns of $\frac{3}{16}$- x 2-in. rectangular nductor separated with 0.010 mil ca between turns, and measures 3-in. inside diameter and 8¼-in. tside diameter. The coil for removal the commutator end race having 4-in. inside diameter and 7½-in. tside diameter consists of five turns $\frac{1}{8}$- x 2-in. rectangular conductor. The transformer and magnetic start- together with a selector switch, are ounted on a rubber-tired cart to fatate handling and application of ater coils. The two-pole, double-tow, 400-amp switch was converted a single pole double-throw type by connecting the jaws and blades in parallel. The left position facing the switch is stenciled "Commutator" and right position "Pinion". Two micro-switches are mounted adjacent to the jaws and operated by one of the switch blades when in either right or left position. Operation of the micro-switch closes the primary of the transformer circuit through the magnetic contactor.

Leads connecting the heating coil terminals to the power unit consist of three 4/0 welder cables in parallel about 4-ft long. A separate ground connection is provided from the transformer frame to the armature frame.

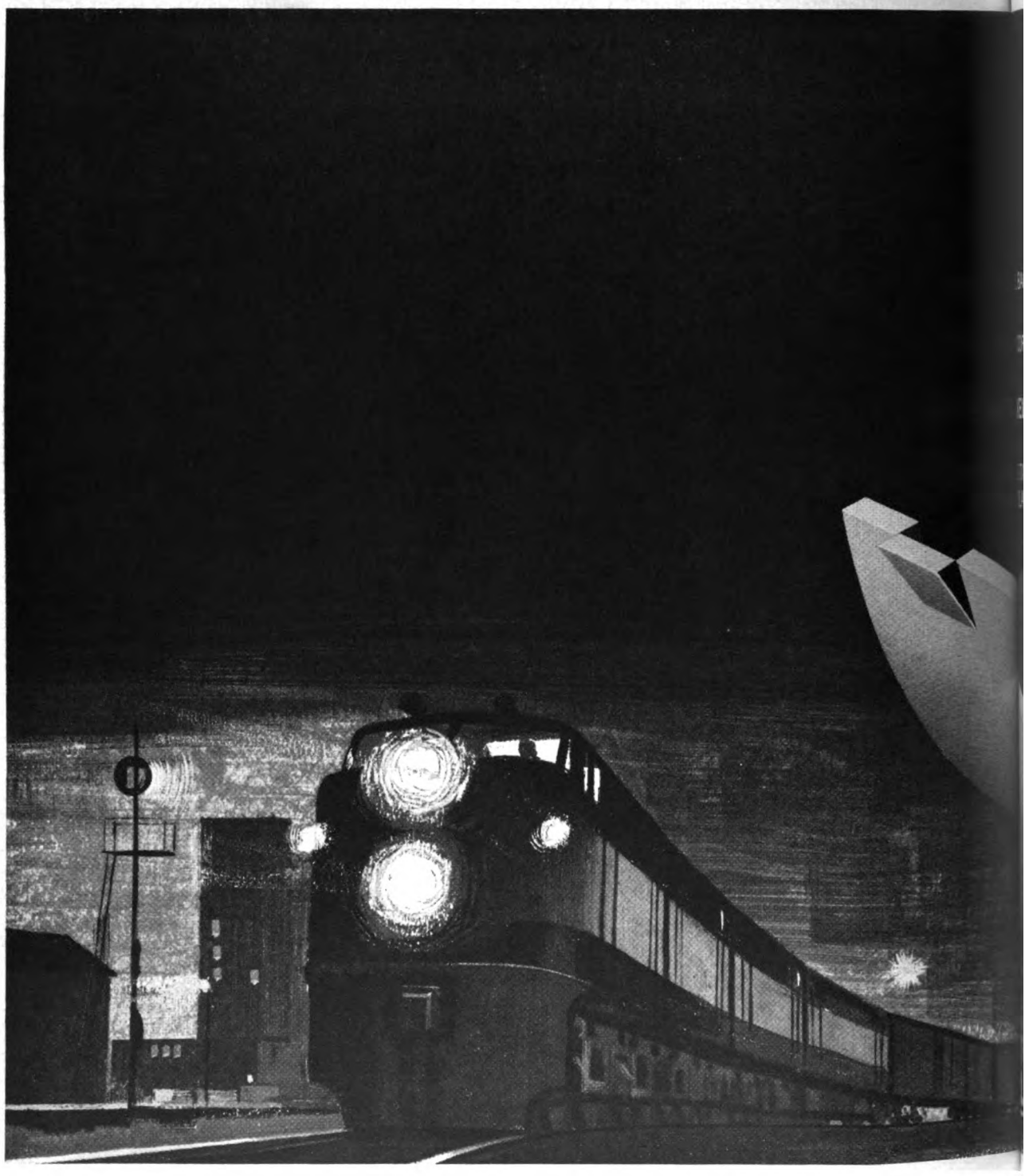
A 200-amp plug connected to a three-conductor No. 4 cable is used for the leads. One of these wires is a ground connection to the heater frame. The heater was designed by R. Sturm, GN electrical foreman at St. Paul.



Coil is in place over inner race and ground connection has been made to armature frame.



Induction heater has been designed for removing race at either the pinion or the commutator end of the armature. Switch on top controls two separate operations.

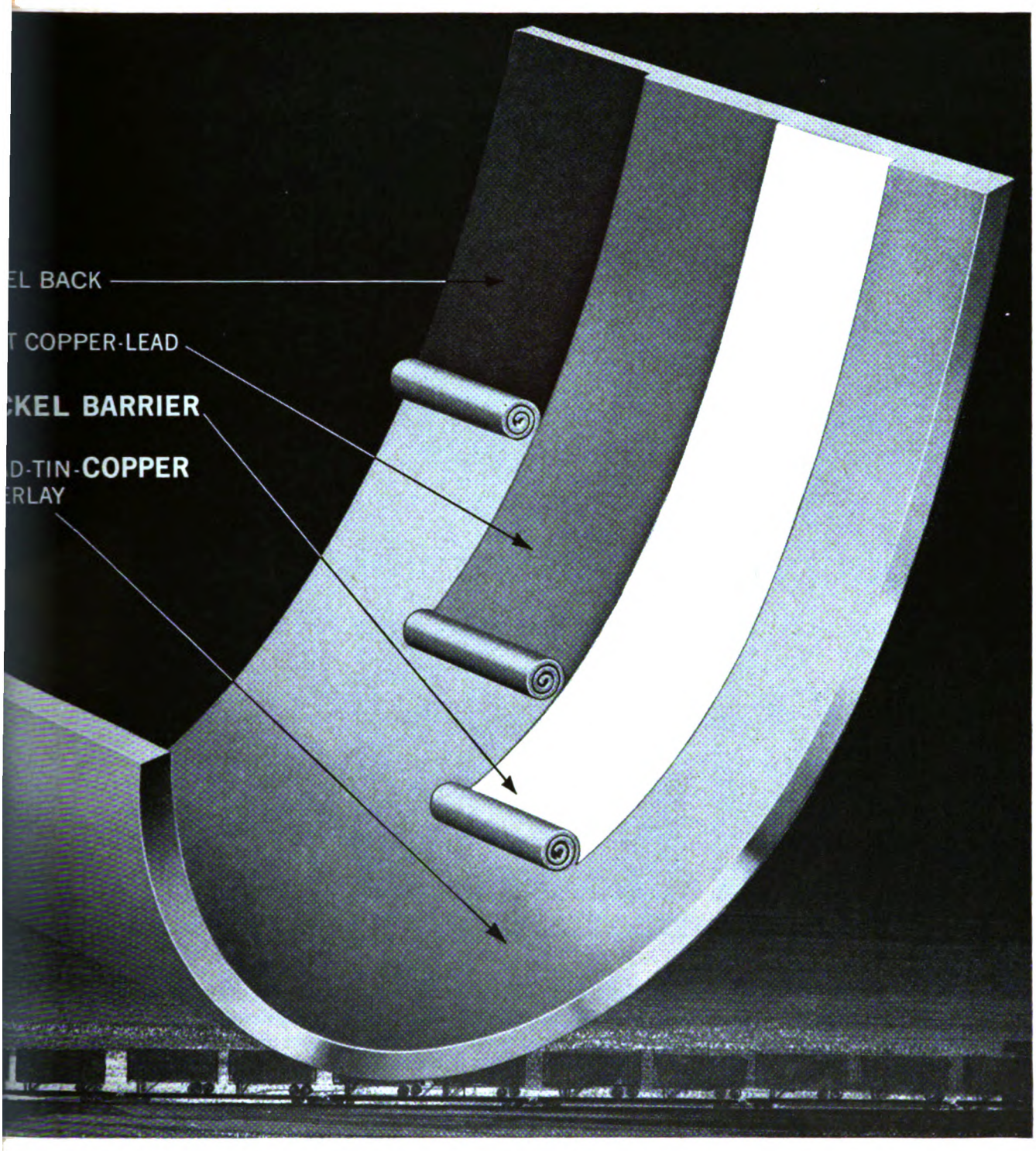


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It's a four layer bearing that has proved its superi
through 12 years' service in all types of diesel and heavy
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This type bearing is *old*, produced for many years at
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ENGINE BEARING REPLACEMENTS

new because this is the first time this bearing has been ilable for use in the EMD engine.

e nickel barrier stops tin migration from the overlay. is produced by adding a micro layer of nickel between the rlay and copper-lead layers. This increases bearing life ause it enables the overlay to withstand corrosion at all es. The abrasion resistance and surface action of the rlay maintain new bearing quality at all times.

pper-Lead-Tin overlay: Fatigue life of the overlay is reased substantially by the addition of 3% copper in the cision electroplated overlay.

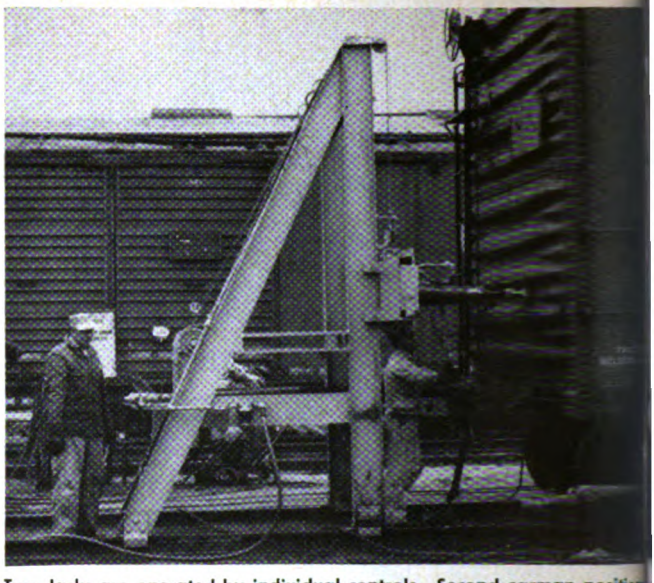
Improved—yet the cost is less! Only Cleveland Graphite Bronze can offer this improved four layer bearing. Take full advantage of this product that combines product improvement with cost reduction. Start extending your engine bearing life today. Cleveland Graphite Bronze, division of . . .

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Also manufacturers and distributors of the Clevite Journal Bearing Cartridge.

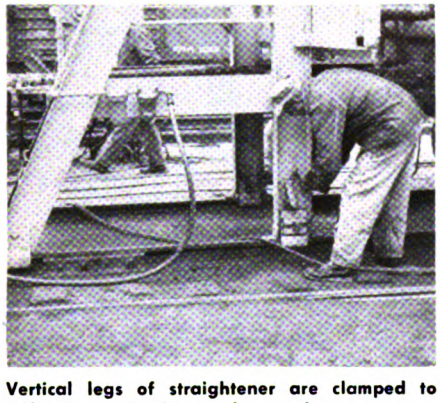


End straightening device is handled by overhead crane. Plans now are under way to build second unit and mount both on transverse monorails.

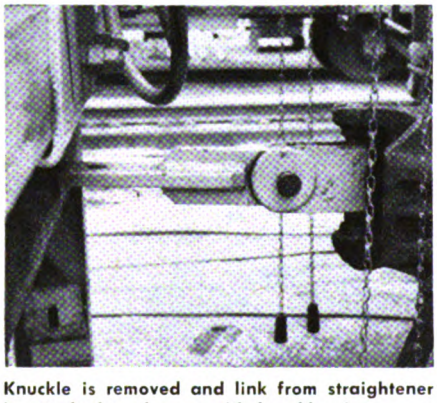


Two Jacks are operated by individual controls. Second carman positions jacks and sights across car ends to indicate work to be done by jacks

ACL Simplifies End Straightening



Vertical legs of straightener are clamped to rail prior to starting work on a box car.



Knuckle is removed and link from straightener is attached to the car with knuckle pin.

Box-car ends are being straightened more rapidly at the Waycross, Ga., shop of the Atlantic Coast Line because of a straightening device recently put into service. Designed and built by the ACL, this device not only speeds the actual straightening operation, but makes it unnecessary to remove the car end linings. By eliminating manual operations, the job also has been made easier and safer.

Light and heavy freight-car repairs are made at Waycross. Demand for box cars and the large ACL ownership make it possible to operate on a full-time basis, two production tracks, assigned to the upgrading and light repairs for box cars. It is on these two production lines that the end straightening device is used. It consists of a heavy triangular frame on which is mounted an adjustable-height crossmember that carries a pair of pneumatic jacks. Position of the crossmember and jacks is adjusted with an air-motor-powered windlass.

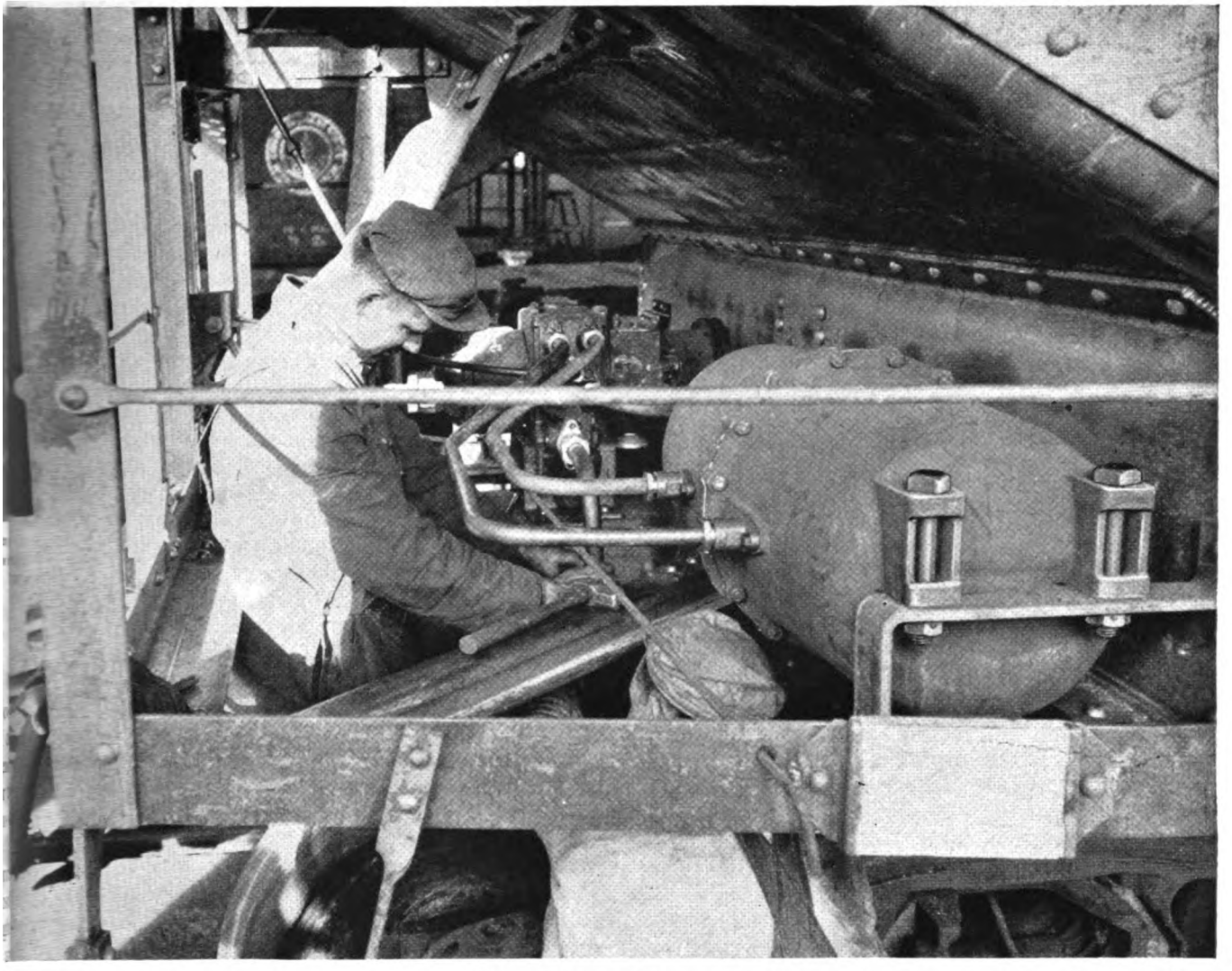
The two 20-ton power jacks are mounted on adjustable crossheads through which pass traversing screws so the jacks can be positioned at any point across the car end. They are individually controlled by an operator who works with a second carman who indicates the amount of straightening necessary by sighting across the end of the car.

The ACL box-car repair lines are served by an overhead bridge crane which is used for moving the end straightener from car to car as work progresses. This crane is almost essential for successful use of the device, according to R. W. Tonning, Jr., shop superintendent. While the straightener can be handled by a fork lift truck, this is neither as convenient nor as rapid as movement with the overhead crane. With a minimum of delay in moving the device from one end to the next, it has been possible for the two operators to straighten up to 40 car ends in 8 hr.

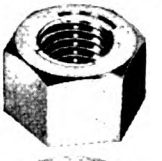
When the straightener is brought to a car end, it is guided into position so that the four legs can be brought down on the rails. The front legs are then clamped to the rail so the straightener will remain in position while the jacks are exerting pressure against the car end. The knuckle is removed from the car's coupler, and a link, held by the knuckle pin, secures the straightener to the car. The two operators then put the device in operation, positioning the jacks to bring them against the car end in the proper locations.

The triangular frame is a welded assembly fabricated of 9-in. I-beams. The windlass is powered by a multi-vane air motor driving through a right-angle gear box. A pair of ⅜-in. steel cables extend over pulleys at the top of the frame to the crossmember which holds the jacks. Overall height is 12 ft 1 in.

The Coast Line is currently making some changes in its production tracks at Waycross. As part of this, it is planned to build a second end straightener. The two will then be mounted on transverse tramrails extending across the three tracks. They can then be moved into position without using the overhead crane, still further simplifying the straightening operation.



ıere are two safe lock nuts for air brake quipment that are also the most economical



The ***M·F Uni-Torque*** lock nut. Prevailing torque lock nut that will withstand terrific vibration and shock loading.



The ***M·F Two-Way*** lock nut. Has the added speed of either-end application, and the *center* lock permits bolt end to be flush with the top of the nut.

BOTH PROVIDE COMPLETE RELIABILITY AT LOW COST

The ***M·F Uni-Torque*** and ***Two-Way*** lock nuts are *all-metal*, deflected thread lock nuts—a locking principle with a successful record of more than 40 years of safe fastening for air brake equipment.

These *proven* lock nuts combine *reliability* with a very substantial savings over the non-metallic type.

Why spend *more* to sacrifice proven protection?

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Jack Frost Visits Doc Watts

By Gordon Taylo

For days a cold wave had gripped the territory served by Doc Watt's railroad. The yard at Centerville was covered with swirling snow, propelled by the sub-zero wind. As Doc entered the diesel shop, he was followed by a blast of the frigid air which, for some time, had been disrupting the smooth operation of that normally efficient shop.

As Doc passed, Jack Jones, a maintainer, commented, "That cold wind is the kind that blows no good for diesels."

"You are so right," responded Doc; "we'll probably find it has blown in some more problems this morning."

Doc proceeded to the foreman's office where he started checking enginemen's trip reports and the line-up of work planned for that day. He was interrupted by Electrician Bud Andrews.

"Doc we need some advice, if you can come out to Unit 770. This unit came in last night dead in a train. When it shut down on the road yesterday morning, the engine cooling system was drained to prevent its freezing. The unit was moved into the shop about the middle of the night so the day shift could start checking for the electrical trouble that had been reported. The battery and lighting systems are OK. We thought we would start with some megger tests to check the insulation of the high-voltage system. When we applied the megger, it showed way less than one megohm resistance to ground. What should we do now?"

"Let's be on our way," said Doc; "I'd like to see this unit before I start talking."

When they arrived at the 770, a GP7 road switcher, Doc continued "Let's first open all the inspection doors to see what we can find.

"It's plain to see that the guy responsible for the low megger readings is Jack Frost," Doc commented after a quick inspection. "Following long exposure to sub-zero temperatures, this unit was moved into this warm shop. It's been in here long enough for condensation to form on the main generator, traction motors, and other parts of the high voltage system. There's a heavy film of condensate nearly everywhere you look, even beads of water on the main generator commutator. In this kind of weather it would seem to be difficult for anyone to work up a sweat, but that is just what this diesel unit has done.

"The heavy coating of moisture provided innumerable leakage paths to ground, causing the megger to register a low reading. This unit can't go back into service until it has been completely 'defrosted' and the parts have been blown out with clean, dry air. If not removed, moisture can cause a flashover either on the main generator, or on the traction motors. Trying to dry this unit with a jet of compressed air is too slow. The engineman's report showed that the diesel engine could operate at the time of the failure, having been shut diwn because of electrical trouble. Let's get the engine going again!

"First, fill the engine cooling system with warm water. The engine should be started and operated at idling speed for a good many hours. The heat developed by the engine and the air flow produced by rotation of generator and blower fans will greatly speed the drying-out process. I'll bet it will be tomorrow morning before this unit can pass a megger test.

"While it is drying out, you fellows can look for a blown fuse or broken control circuit that caused someone to shut it down and drain the engine."

"If this cold wave came down from Canada and is a sample of Canadian weather, I'm glad I work here," said Bud.

"Jack Frost is not such a troublemaker in Canada," replied Doc. "Railroaders there know how to get along with him. I recently had the pleasure of hearing a foreman from a Canadian road explain some of their methods for successful operation in sub-zero weather. When a unit is shipped dead in zero weather, they take special care to prevent the formation of moisture before it is put in service. They first check the unit to see if it requires fuel or oil and do *everything* possible *before* putting the unit in the shop. Water is then put in the cooling system and the engine is started *as soon as possible* after the unit is placed inside.

"As soon as the engine is runnin properly, the unit is moved to an out side track where it can be operate under its own power at reduced speed The application of power to the trac tion motors and the production o power in the main generator have heating effect, drawing out and evapo rating the moisture. Drying is furth aided by the movement of air caus by rotating parts and the traction mo tor blowers. The unit is kept movin long enough to be dried thorough before it is placed in service. A meg ger will show when it is ready.

"Getting back to our own case Doc went on, "because we still hav some work to do on the 770, we keep it in the shop and dry it out b idling the engine. With an air hos we can speed the drying while we d our other work."

About this time, one of the ele tricians who had been checking fus and contactors reported that he ha just discovered a blown fuse that ha been the cause of the failure. Ap parently the engineman had becom excited and failed to make a thorou examination of all the fuses.

Doc instructed his maintainers t continue the drying that he had pre scribed. He then said, "I want one o you men to check the batteries o units that are stored in the yard to s if any are frozen."

"I didn't think batteries woul freeze," exclaimed one of the appre tices.

"So that you'll always remembe that they can," said Doc, "it would b well for you to go with Mike to chec the batteries on those units stored ou side and also on the yard switcher

"The freezing point depends on a electrolyte strength which, in turn, de pends on the charge. A solution wi a specific gravity of 1.250 will no freeze until cooled to a temperature o 62 deg F below zero. An acid solu tion of 1.150 gravity will freeze at 1 deg above zero. It was 10 below thi morning and that will freeze a batter with a 1.200 gravity reading. I won'

(Continued on page 42)



"What's Trump?"
"They're All Trump!"

AND THEY'RE AVAILABLE NOW FROM GRIFFIN

ake your pick . . . Griffin's 28-inch and 36-inch heels with parabolic plate design are now avail-ble with one-wear, two-wear, or multi-wear design. They're manufactured by the same EQS® process as the standard 33-inch wheel . . . over 2 million of which are now in service in the United States and Canada. Take your pick. You can't go wrong with Griffin.

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ONE OF THE Amsted INDUSTRIES

be too surprised if Jack Frost has nipped some of our batteries.

"Give me a report on the battery situation as soon as possible," Doc said as he turned to his office.

In an hour Mike and his partner came in to report that they had found a unit which had come off second best in a tangle with Jack Frost. Two battery trays had frozen and the burst battery jars would require replacement.

"Those trays will have to go to the battery shop," said Doc unhappily. "Check that unit to find why it had weak batteries. Here's another case where extra care should have been taken to enable us to meet Jack Frost."

"I haven't told you all the troubles," said Mike. "As we came by the service track we found a yard switcher stalled for lack of fuel. The service gang foreman said, 'I don't think this is electrical trouble, but please tell Doc that I would appreciate his coming to our rescue. We need his voice of experience.' "

"All right, Mike," said Doc as he began to pull on his heavy coat. "Come along with me in case we do run into electrical trouble and need some extra help."

When they arrived at the service track, Doc checked the fuel pump motor on the stalled unit. The pump would run, but the engine was not getting fuel. "Look's like Jack Frost has been here too," he muttered. "We probably have a freeze-up at the sump on locomotive fuel tank."

He opened the drain plug to find his fears confirmed. A sludge of ice crystals poured out, indicating that the fuel supply line was frozen, cutting off the engine's fuel. It also indicated that something must be done to drain accumulated water from the bottom of the tank. A steam hose helped solve that problem. By playing steam on the fuel tank sump and fuel supply sump, it was possible to hasten drainage of water from the fuel tank.

"I recall several years ago, when in zero weather we had several cases of fuel-line freeze ups, we found that the addition of a gallon of alcohol to the fuel tank helped keep the fuel-supply line from freezing. In this kind of weather, the sump drains deserve more frequent attention. At the fuel station pumping plant storage tank drains should be checked regularly and operated. There will be more than the usual amount of water in the sump of the bulk storage tank. This cold wave could touch off an epidemic of diesel delays, unless we do something to assure water-free fuel supplies."

"Thanks for your advice Doc," said the service track foreman. "I wonder why that other switcher is coming in. It's not time for it to come in for servicing. Wait till we see what's wrong."

As the switcher stopped, Doc climbed aboard and asked Engineman O'Brien "What's your trouble, John? Your engine seems to be running OK."

"It's running," answered John, "but I think it must have had a chill. Water temperature is very low, and the cab heater is so cold we can hardly stay in the cab."

Doc first checked the automatic radiator shutters. While they were in closed position, they did not seal the openings. A check revealed that so one had adjusted the shutter rods properly. Threads on some of the operating rods had been worn so that when adjusted to the portions with good threads, the rods were too short to permit full closure of shutters.

"Finish this shift by placing a canvas cover in front of the radiator," Doc directed. "To make proper repairs, the unit must come into the shop.

"I must get back to my regular work," Doc told the service gang foreman. "All day long I've been jumping hurdles set up by Jack Frost. I hope he will soon return to his home in the Far North. Where not a regular visitor, he certainly can make diesel maintenance tough. I know one thing, we must be better prepared to meet the next cold wave that strikes these parts."

RRs Must Improve Existing Cars

(Continued from page 26)

solid-bearing journal-box assembly. The next step should be containment of fore-and-aft movement, and the development of a rear journal-box seal, while helpful, should not in any way interfere with a prompt decision on restricting fore-and-aft movement.

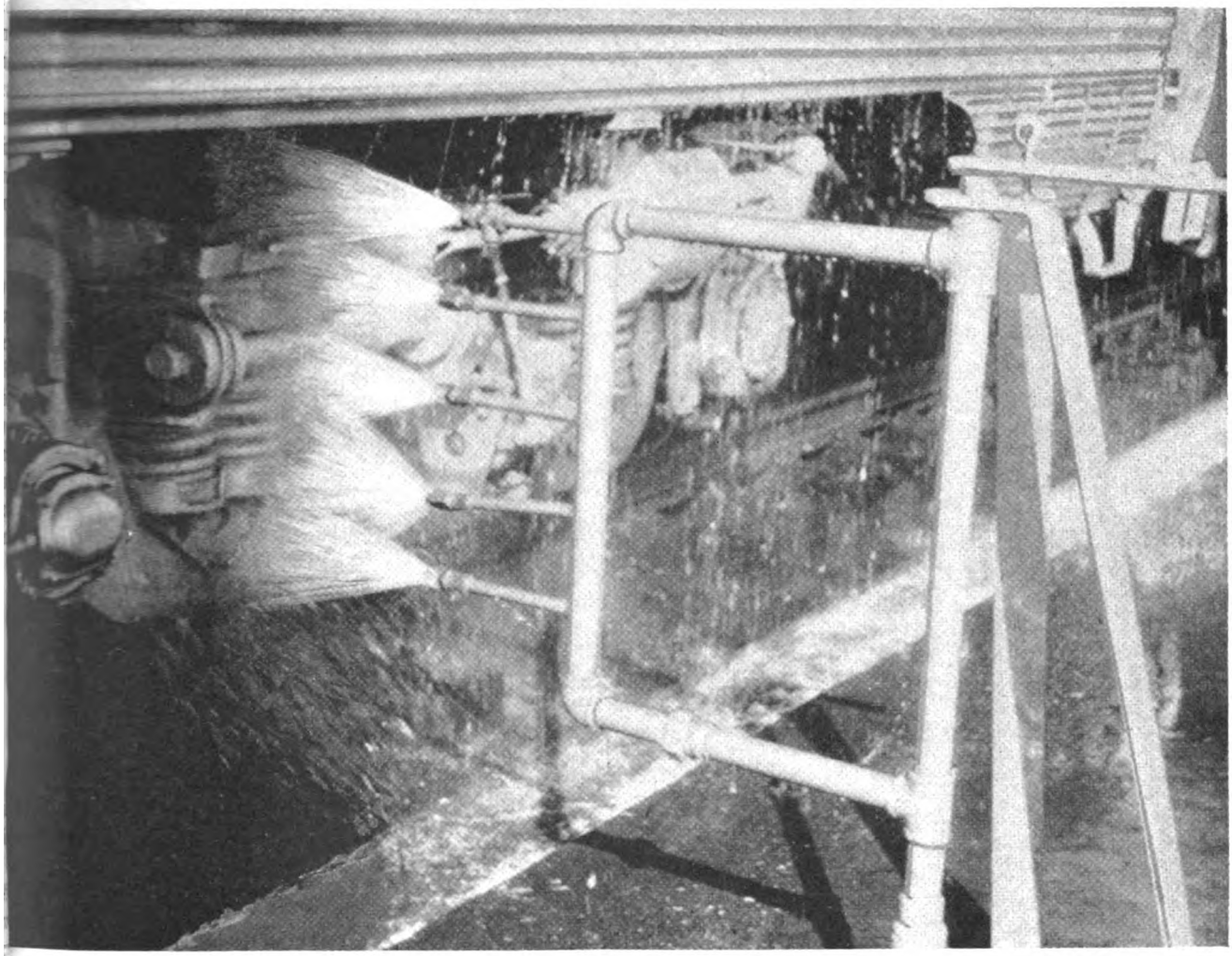
There has been some resistance to improvement of the solid journal box assembly by the proponents of roller bearings in the past, even though they must have realized that the financial problems confronting the railroads precluded application of roller bearings in sufficient quantity to provide the solution to the hot-box problem.

Roller bearings are a good product, they do a good job and they should be used whenever possible. We must not lose sight of the fact that only 129,000 freight cars are presently equipped with roller bearings and that 94% of all freight cars are still moving on solid bearings. With the present cost of roller bearings running from $730 to $820 per car set for the quantity sizes it can be appreciated that the $1.3 billion necessary to provide for roller-bearing assemblies on all freight cars presents quite a problem to the railroads at the present time. Information is now available to railroads showing that the continued improvement in the solid bearing assembly has reduced the estimated cost of operating solid bearings today to less than half of that determined by the AAR in 1954.

There is one other improvement that can be made in freight car truck maintenance that should be given more attention. Closer tolerances for wear between column guides and truck bolsters should be considered. Some progress was made recently when wear limits were provided for in Rule 1 of the Interchange Rules establishing a maximum clearance between bolster and side frame columns of 1⅛-in. and a total longitudinal clearance of 3½-in. Further study should be given to this subject and more restrictive limits for wear should be established in order that fillet and collar heating of solid bearings be improved.

In the automobile industry improvements are continually being made in the product and each new model provides the customer with an improved product. The short life span of the automobile provides the car owner these improvements without having to wait too long. The same situation does not obtain in the freight-car field; it is necessary that we give our customers improvements in existing cars rather than require him to wait for the new cars.

Oakite adds more POWER to your MANPOWER



Oakite SPEEDET...

The New, Heavy-Duty Liquid Detergent Cuts Railroad Maintenance Costs

Here, now, is New Oakite Speedet—the heavy-duty liquid detergent—designed and developed for the cleaning of running gear, fuel tanks, water tanks and locomotive exteriors.

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When, next, your Oakite man calls on you why not arrange for a test-run on Oakite Speedet? See for yourself with your own set-up. No obligation. And, of course, you can get the complete Speedet story merely by writing Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

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SCIENCE



HOW MUCH LADING PROFIT CAN YOU AFFORD TO LOSE ON THE WAY? 8%? 5%? 2½%? Actually, it's the *payload that gets there* which counts. That's why you have to hold down lading losses for maximum hopper car profits.

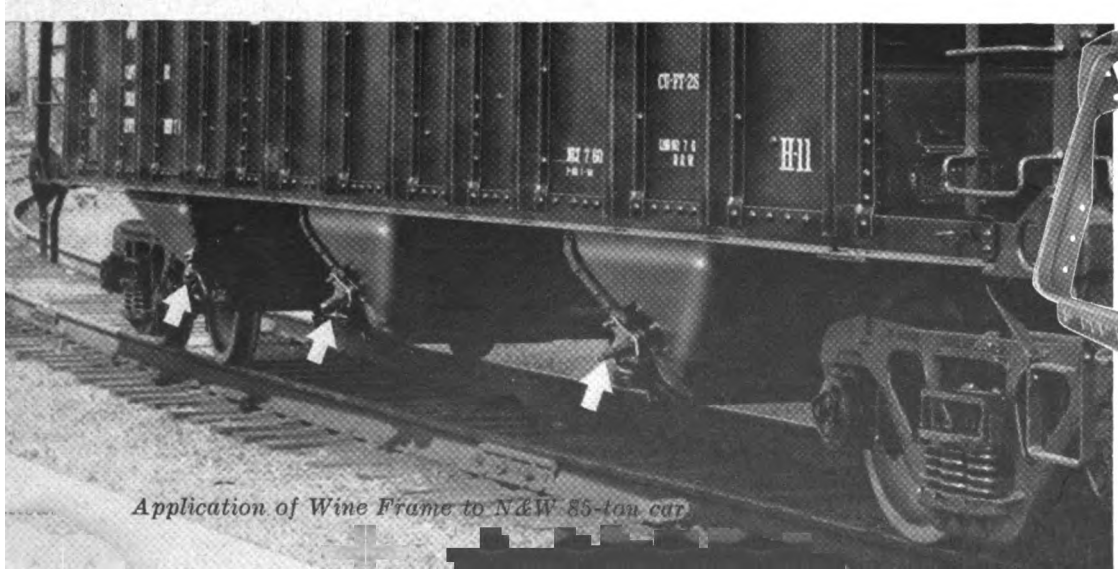
STOP LADING LOSS

Wine Hopper Frames help stop such loss long after other frames have sagged or corroded. They fit tight. Each unit is a one-piece precision steel casting. Tough, rigid, distortion-free. Hinge lugs and door lockpads are integral parts of the frame, assuring permanent alignment, bind-free operation and strong resistance against daily abuse of loading impact.

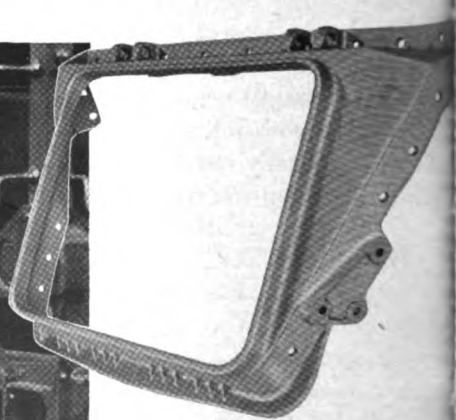
Tied into side or center sills, Wine Hopper Frames add strength to the hopper unit and increase rigidity of the car's entire understructure. Many frame pattern variations available, tapered or flat rim fit, designed to stop lading loss for most type hopper cars.

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WITH WINE ONE-PIECE CAST STEEL HOPPER FRAMES



Application of Wine Frame to N&W 55-ton car

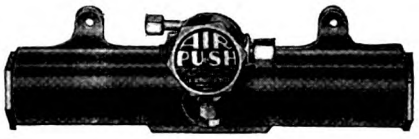


Your Wine representative will be glad to work with you on Wine Frame applications for your requirements.



...all equipped with SPRAGUE *Air-Push* Windshield Wipers!

Air-Push Jumbo Rotary Seal Windshield Wiper Motor—"standard" of the industry.



...se three locomotives—Southern Pacific, Union Pa-...c and Santa Fe—are equipped with safe, sure, ...pendable Air-Push Windshield Wiping Equipment, ...are 95% of all modern diesel locomotives. De-...ned for heavy duty, all-weather service with mini-...m maintenance.

SAFETY STARTS WITH SEEING!

Sprague DEVICES, INC.
MICHIGAN CITY, INDIANA

...port

(Continued from page 5)

...onal or regional basis through a cen-...AAR office, relieving the individual ... of the time-consuming clerical work ...existing.

...Greater utilization of car equipment ...gh an accurate and current inventory ...s.

... obtain these greater benefits of the ...dentification system, it would have to ...iversal. Preliminary economic studies ... on the prices in the specifications in-...: that 20 railroads, representing 80% ...e total car ownership, are justified in installing the car devices on non-member cars, as well as their own cars, to realize the financial savings inherent in this system.

The Transdata system would beam microwave energy at the "codeflector" (from "code reflector") on the car from a wayside transmitting antenna. A second wayside antenna would receive the signal reflected from the car's identification plate.

The car's identity would be coded by means of a series of slots about ½ in. long in a strip of metal. This metal strip would be about 2 ft long by 2 in. high, and would be attached to the top of the truck side frame. The metal strip would most likely be made up of individual pieces of metal, each with one character and the corresponding coding slots. These pieces could be quickly put together in a holder to form any car's identification marks. The slots will reradiate the micro-wave energy back to the wayside receiving antenna.

In the US&S system, an infrared light source is mounted on a pedestal at the wayside, so as to illuminate a reflector plate mounted on the car body. This light source has sufficient intensity to operate in all weather.

The car identification plate, 22 in. long by 6 in. high, has a material bonded to it in a sequence of reflecting and non-reflecting surfaces, so arranged as to produce the car identification symbols in teletype code. The manufacturer of the reflective material guarantees its adhesion and reflectivity for a period of three years under any weather conditions, and from five to six years with a minimum of maintenance.

Orders and Inquiries for New Equipment

Placed Since Closing of February Issue

...l Electric ...motive Orders

...ASH.—*General Electric:* 15 2,500-hp U25B ...otives for mainline freight service. Cost, ...3,500,000. Delivery begins in May.

...ht-Car Orders

...ERICAN REFRIGERATOR TRANSIT.—*Pacific Car ...undry:* 140 50-ft, 70-ton mechanical refrig-... meat cars. Cost, approx. $28,800 each. ...ugust delivery.

...IGOR & AROOSTOOK.—*Pullman-Standard:* 60 ...rs, 30 with hydracushion underframes and ...ith hydroframe underframes. For April ...y.

...LINGTON.—*General American:* 25 50-ft in-...d box cars, with DF equipment. Cost, ...00. *Company shops:* 50 40½-ft, DF cushion ...frame box cars; 100 65-ft, 70-ton gondolas; ...½-ft, 70-ton bulkhead gondolas; 120 40-ft, ...-deck stock cars; 100 60-ft, 60-ton flat cars, ...0 rack cars for autos and farm equipment. ... orders all part of road's 1962 equipment ...am (RL&C, Jan. 1962, p 7).

...ADIAN NATIONAL.—*Marine Industries:* 165 ...d hopper cars. *Montreal Locomotive Works:* ...ered hopper cars. 135 cars to be aluminum, ...type, of 3,000 cu ft capacity, same as proto-... (RL&C, Oct. 1960, p 42). *National Steel* ...500 50-ton, 50½-ft box cars with 16-ft door ...ngs (for June-July delivery); 100 70-ton ...covered hopper cars (for May-June de-...).

...TON BELT.—*Thrall Car:* 50 70-ton wood chip ...r cars. Scheduled to be placed in operation ...in spring.

...VER & RIO GRANDE WESTERN.—*Bethlehem* ...200 70-ton open-top hoppers; 27 53½-ft 50-...ulkhead flat cars. *Pacific Car & Foundry:* ...0-ton, 50-ft insulated box cars, with damage ...oading devices. All cars to have roller bear-...

...INOIS CENTRAL.—*General American:* 66 50-...-ton insulated box cars with Evans loading ...es. Cost, $1,300,000 (part of 1962 $17,000,000 ...ment program). For May delivery.

MERCHANTS DISPATCH.—*Pullman-Standard:* 100 89-ft, 55-ton low-deck flat cars for auto rack installation.

NORTH AMERICAN CAR.—*Pacific Car & Foundry:* 46 50-ft insulated box cars with protective loading devices. For first quarter delivery.

PENNSYLVANIA.—*Company shops:* 2,850 70-ton hopper cars; 50 heavy-duty flat cars. Scheduled for service by mid-year.

ROCK ISLAND.—*Pullman-Standard:* 50 50-ft, 70-ton insulated box cars. For late March or early April delivery.

UNION TANK CAR.—*Company shops:* 47 tank cars, including two 30,000-gal; six 20,000-22,000-gal; three 12,000-gal; four 10,000-gal; 15 8,000-gal, and five 3,000 gal.

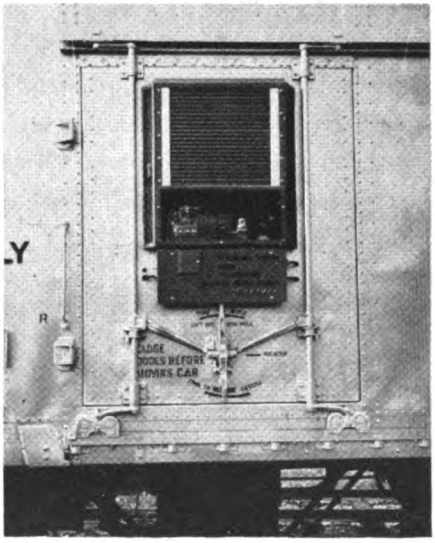
WESTERN PACIFIC.—*Pacific Car & Foundry:* 200 50-ft 4-in., 70-ton insulated box cars. Cost, $3,301,000.

Louisville & Nashville will purchase 450 70-ton box cars equipped with long-travel cushion underframes and "damage free" bracing (cost, $6,828,-750); equip 100 existing 50-ton box cars with bracing (cost, $180,000), and convert 20 flat cars into 70-ton bulkhead cars for shipment of automobile parts (cost, $170,000).

Notes and Inquiries

MISSOURI PACIFIC, as part of 1962 equipment program, (RL&C, Dec. 1961, p 6), will spend $1,881,000 for 25 Airslide hoppers, 20 85-ft piggyback flats; 55 tri-level and five bi-level auto racks, and 50 70-ft mail storage cars.

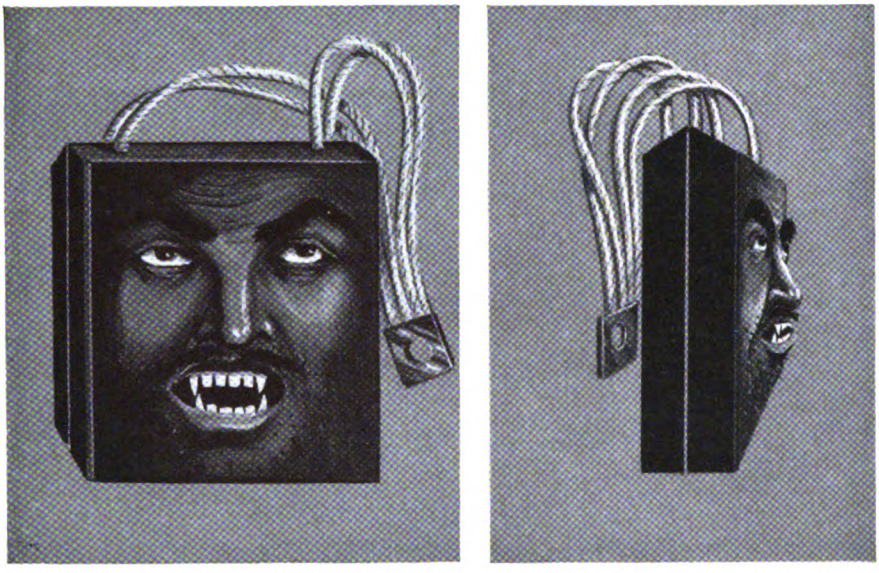
Pennsylvania's 1962 program includes, in addition to cars listed above, rehabilitation of 1,000 hopper cars and 700 box cars, and heavy repairs for approximately 800 other cars of various types. In addition, special equipment is being added to 1,085 existing cars, including 400 leased piggyback cars, to be equipped with new PRR-owned multi-level racks for carrying autos; 218 box cars, to be given load-securing devices, and 467 gondolas, 300 of which will be refitted with weathertight hatch covers and 167 with removable hood-type covers.



CN Testing Door-Mounted Mechanical Reefer Unit

Mechanical refrigerator cars equipped for the handling of fresh produce in the 28 to 70 deg F temperature range are under test by the Canadian National. Fitted with door-mounted mechanical refrigeration units—one unit per car—the eleven cars now in service were converted from conventional

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Commutator Eating Brush

wanted by S.P.C.C.* for repeated and vicious attacks on railroad profits. Feeds on expensive commutators found in traction motors and generators of diesel-electric locomotives. Often causes damages resulting in hospitalization and extensive rehabilitation of victims.

Proceed with extreme caution. Suspect is wary and extremely difficult to handle. If whereabouts are known, immediately contact Stackpole Carbon Company, St. Marys, Pa., who will dispatch a special brush trainer uniquely skilled to deal with suspect.

Society for the Prevention of Cruelty to Commutators.



STACKPOLE *diesel-electric* **BRUSHES**

for maximum mileage consistent with optimum commutation

electrical contacts • seal rings • welding & brazing tips • electrochemical anodes
graphite bearings • voltage regulator discs • electrical & electronic components
rocket nozzles

overhead-ice-bunker cars. The CN oper over 5,000 ice refrigerated cars of var types and, according to a railroad annou ment, its first experiments with mecha refrigeration might eventually lead to replacement of the ice systems.

The eleven test cars are operat throughout Canada, carrying ladings such beef, dairy products, and fresh vegeta and fruit. The cars have yet to be te under full-load, sustained summer opera conditions.

The completely new feature is the do mounted refrigeration system, the first of kind in North America. Designed by nadian National's research department, system utilizes Carrier 1½-ton units of type specifically designed for the car a cation. The car has a "semi-envelope" of air distribution.

An independent diesel-electric po plant for the refrigeration system requ refueling only every 20 days and an change every 50 days of operation. diesel engine is 18 hp; the generator kw.

Because all the refrigeration compone are contained in the door, very little alte tion is needed to convert the conventio ice refrigerator cars, and there is no re tion in usable load space. Since it is loca in the center of the car where the CN determined that the components will rec the least shock, the door-mounted eq ment is expected to have greater reliabi and lower maintenance costs than bunker installations. Door units are movable and interchangeable so that can continue in service while defective frigeration units are being repaired.

Personal Mention

Baltimore & Ohio.—Officers of newly ganized mechanical department (RL Feb. 1962, p 42) named as follows: *B more, Md.:* E. A. KUHN, chief mecha officer. V. P. MORGAN, manager of mech cal planning and production, reports Mr. Kuhn. A. W. GIBSON, superinten locomotive operation, and E. STIMSON, superintendent locomotive maintenance port to W. F. DADD, general superinten of motive power, who reports to Morgan. J. J. EKIN, JR., superintendent cial equipment and parts manufacture: F FINDLING, superintendent car inspection maintenance, and W. C. REISTER, supe tendent car construction and major rep report to W. A. MULLEN, general supe tendent rolling stock and special equipm with supervision over freight and passe cars. Mr. Mullen also reports to Morgan, as will F. R. GEISELMAN, mecha cal engineer; R. W. SENIFF, engineer and specifications; C. M. MACHIN, JR., e trical engineer; A. W. MCELVANY, engin mechanical methods, and A. M. SCH engineer mechanical appliances.

Locomotive and car shops to be opera separately with Mr. Stimson having juris tion over locomotive shops at Cumberla Md., and Glenwood, Pa., and Mr. Reis having jurisdiction over car shops at Key W. Va.; DuBois, Pa.; Glenwood; Brunsw



mer A. Kuhn



V. P. Morgan



W. F. Dadd



W. A. Mullen

and Washington, Ind. Mr. Ekin will vise Cumberland, Md., bolt and forge and handle vehicle and trailer mainte-e. Reporting to Mr. Gibson will be er mechanics R. A. SHIELDS, JR., Cumnd; J. A. F. CRAIG, Pittsburgh; T. J. ENSON, Willard, Ohio; O. M. DORSEY, innati, Ohio, and I. L. FRYE, Baltimore. rting to Mr. Findling will be the folg general supervisors of car mainte-e: J. F. PEACH, Baltimore; W. S. FURCumberland; K. F. MEWSHAW, Graf-W. Va.; A. F. PUGH, Willard, and . PALMER, Cincinnati. Other promoor title changes are: L. M. SCHALK, er carbuilder, Baltimore; W. O. SINES, visor special programs; J. N. MINNS, superintendent, Du Bois; J. T. CONY, shop superintendent, Washington, H. M. DOWLING, supervisor of car inion and maintenance, Baltimore, and S. ENGLEHART, supervisor electrical ment.

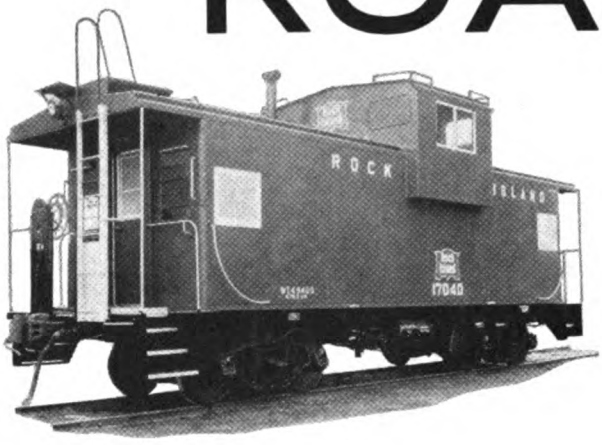
OWARD P. WRIGHT, electrical engineer; ICKER, assistant mechanical engineer-FRANK A. CARDEGNA, engineer motive r, and W. H. GORDON, assistant to chief anical officer—all at Baltimore—have ed.

dian National.—*Montreal:* D. M. BRESE appointed research engineer, research development department. *St. Albans,* D. L. SHEPARD appointed superintendnotive power and car equipment, sucing Mr. Bressette on Central Vermont. Shepard formerly general foreman, ve power and car equipment.

Lackawanna.—*Cleveland, Ohio:* L. E. ETTE, assistant superintendent car dement—staff, appointed superintendent edepartment, succeeding KENNETH H. PENTER, who has retired because of ill th. D. H. DECKER, assistant superinent car department, Eastern district, apted assistant superintendent car departt.

hern Pacific.—*St. Paul, Minn.:* R. C. BES, valuation inspector, appointed me-

one for the ROAD



...that won't drive you to drink

There are some on every railroad . . . cabooses that eat up as much money as they do miles. Why not retire these rolling profit-reducers in favor of new International Cabooses. Your crews would enjoy the extra comfort — and be far more efficient as a result. Your books would reflect the savings in maintenance. We build several standard models — or — if you've got your own ideas, we'll work to your specifications.

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INTERNATIONAL CAR DIVISION
A Subsidiary of Ryder System, Inc.

chanical valuation engineer, succeeding C. W. HEMSWORTH, retired.

Richmond, Fredericksburg & Potomac.—*Alexandria, Va.:* ELMER GARNER appointed master mechanic at Potomac Yard, succeeding G. A. KIDWELL, deceased.

Southern.—*Washington, D.C.:* AUBREY M. CARY named assistant chief mechanical officer-maintenance. *Atlanta, Ga.:* GEORGE L. SOUTHER, JR., appointed superintendent motive power, succeeding Mr. Cary. JAMES L. GREGORY, BOBBY S. SWICEGOOD, and DUANE B. WEDAN appointed general foreman. *Spartanburg, S.C.:* LAWRENCE S. PRESSON, JR., appointed manager, Hayne shop, succeeding Mr. Souther. *Monroe, Va.:* ROBERT W. ELIUM appointed general foreman. *Ludlow, Ky.:* FRANKLIN E. CRANFIELD appointed master mechanic. *Lynchburg, Va.:* THOMAS M. KERNS, JR., appointed general foreman. *Salisbury, N.C.:* GLEN GOLDSTON appointed general road foreman of engines. *Louisville, Ky.:* C. E. ATKINS appointed road foreman of engines. *Birmingham, Ala.:* KIT H. LOVELESS appointed road foreman of engines, AGS. *Charlotte, N.C.:* RUSSELL LIVENGOOD appointed materials engineer—mechanical and roadway.

Wabash.—*Decatur, Ill.:* A. L. VEITH, acting manager motive power and car equipment, appointed manager motive power and equipment, succeeding BERLYN J. PAYNE, retired.

Supply Trade Note



W. S. Johnson
Brenco



Phillips W. Berg
Gould-National

GOULD-NATIONAL BATTERIES, IN
INDUSTRIAL BATTERY DIV.—*Phillips Berg* appointed manager of railway sa
Chicago region. Mr. Berg formerly r
way specifications engineer.

■

HYATT BEARINGS DIV., GENERAL M
TORS CORP.—*Grover B. Baxley* appoin
railroad sales manager at Chicago, sup
vising salesmen selling all U.S. and Ca
dian roads.

■

GARLOCK INC.—*Edward M. Thomas*
pointed general sales manager at Palm
N.Y., succeeding *Thomas L. Denney*
signed. *Thomas L. Reedy* appointed
troit district manager, succeeding
Thomas. *Williard G. Nims* appointed
trict manager at Los Angeles, Calif., s
ceeding Mr. Reedy. Mr. Nimes forme
sales representative, Rochester, N.Y.

■

YALE & TOWNE MANUFACTURI
CO.—*Frank J. Finn*, Salem, Va., plant m
ager, appointed to fill newly created p
of division manager of special project s
at White Plains, N.Y., including sales
transportation equipment industry.

■

GENERAL AMERICAN TRANSPORT
TION CORP.—*F. Walter Horner*, direc
of engineering, appointed manager of
Technical Center where research and
velopment is being coordinated to "acce
ate the speed with which the techni
knowledge and experience" of the en
company "can be placed in use by any
sion or subsidiary to solve problems of
tomers." Headquarters of the Center ar
131 S. Wabash ave., Chicago.

■

MACLEAN-FOGG LOCK NUT CO
R. H. Waite appointed vice-president
railroad sales. *H. J. Voss* named assist
vice-president, railroad sales.

■

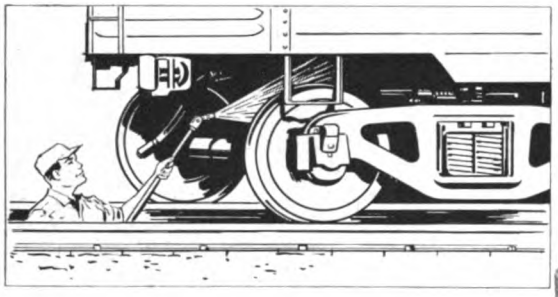
BRENCO, INC.—*W. Stuart Johnson*
pointed sales manager.

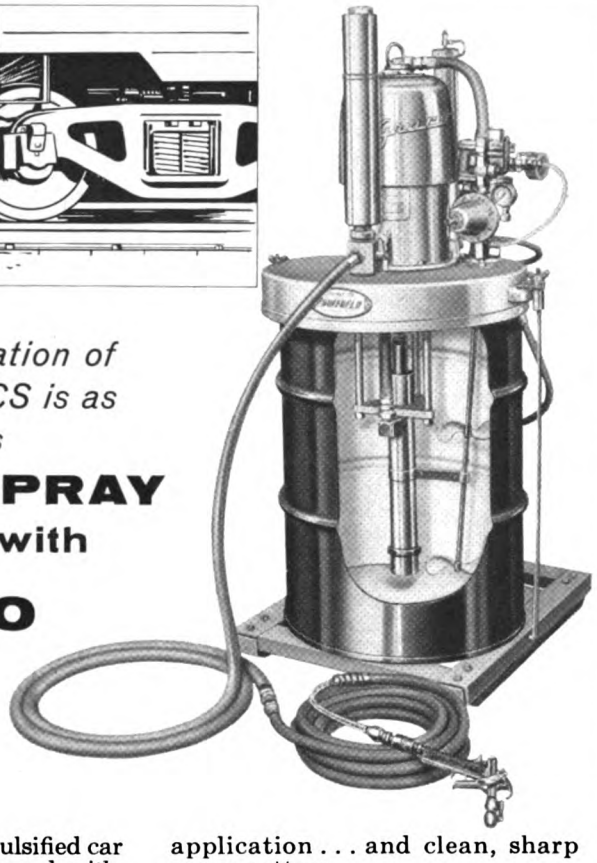
■

DAYCO CORP., RUBBER PRODUCTS DI
Division being moved from suburban C
cago to Dayco headquarters in Day
Ohio.

■

AMERICAN BRAKE SHOE CO
Emrick Pohling appointed district s
manager for Railroad Products at St. P
Minn., succeeding *Stephen S. Conway*,
now assistant to the president of Ameri





Now...application of heavy MASTICS is as easy as

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Typical cut back and emulsified car cements can now be sprayed *without atomizing air*. Result . . . heavier coatings are applied with a minimum of cratering and pinholing. Overspray is eliminated and inside corners are covered easily. Benefits . . . extra protection against corrosion and abrasion . . . extremely fast application . . . and clean, sharp spray pattern.

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New Reversa-Clean Spray Tip eliminates clogging problems . . . can be cleaned in seconds.

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CHICAGO—(Broadview, Ill.)
R. D. Worley
3030 South 25th Ave.

CLEVELAND
M. H. Frank Company, Inc.
1202 Marshall Building

HOUSTON
Houston Railroad Supply Co.
1610 Dumble Street

PHILADELPHIA
The A. R. Kidd Co.
1036 Suburban Station Bldg.

LOUISVILLE
T. F. & H. H. Going
6308 Limewood Circle

ST. LOUIS
The Carriers Supply Company
818 Olive Street

NEW YORK—Newark, New Jersey
R. A. Corley
744 Broad Street

SAN FRANCISCO
The Barnes Supply Company
Rm 504, 74 Montgomery Street

TWIN CITIES—St. Paul, Minn.
The Daniel L. O'Brien Supply Company
Endicott-On-Fourth Bldg.

WASHINGTON—Arlington, Va.
Southeastern Railway Supply, Inc.
2304 Wilson Blvd.

MONTREAL—Ontario, Canada
International Equipment Co., Ltd.
360 St. James Street West

keblok Division. Railroad Product 's representative transfers: James B. *iorn* from Chicago to St. Paul, and *hard K. Brush* from Denver to Chicago.

■

CK MANUFACTURING CO.—*Roy Ford* has joined sales staff, covering thern Region. Headquarters, Orlando,

■

UNGSTOWN STEEL CAR CORP.—*ar* trademark and complete patent rights Youngstown cargo-protection products *iired* by *Shunk Manufacturing Co.*, Bu-*is*, Ohio, a subsidiary of *Chromalloy p.*

■

HAEFER EQUIPMENT CO.—*C. W. ght, Jr.*, vice president-sales, appointed *:utive* vice president.

■

ERICAN STEEL FOUNDRIES IN-RPORATED.—*C. E. Grigsby* elected ident of ASF, a subsidiary of Amsted *istries* Incorporated. *E. A. Walcher*, elected vice-president and division gen- manager, Transportation Equipment *ision*. *W. C. Taylor* is vice-president in *ge* of sales. *H. W. Chapman* elected -president and general manager of *nmond* division. *L. L. Phelps* is division s manager.

■

E ORGANICS, INC.—*Lien Chemical* 9229 West Grand ave., Franklin Park, named exclusive sales agents for Fine anics in Illinois, northwestern Indiana, eastern Wisconsin.

STANDARD FORGINGS CO.—*William H. Krause* appointed director of sales and *John P. Lynch*, manager railroad sales.

■

TURCO PRODUCTS DIV. OF PUREX CORP., LTD.—*Sellers Injector Corp.*, Philadelphia, Pa., acquired by Turco, but will operate as a separate activity. *Robert R. Streeton* will serve as national sales manager.

■

GENERAL STEEL INDUSTRIES, INC.—*Edwin B. Meissner*, president of St. Louis Car division of GSI, named vice-president of parent company.

■

EVANS PRODUCTS CO.—*J. R. Byrne*, sales manager, Railroad Equipment Loading Division, at Plymouth, Mich., appointed general manager of the division, succeeding *Ben Colman*, vice-president in charge of the division, who is retiring. *R. K. Tobin*, district sales manager, Railroad Loading Equipment Division, Chicago, named general sales manager of the division, succeeding *E. W. Peterson*, assistant vice-president of the division, who is retiring. Both Mr. Colman and Mr. Peterson will continue to act as Evans consultants.

■

TIMKEN ROLLER BEARING CO.—*William P. Cox*, design engineer, Railway Engineering Division, retired.

■

MONTREAL LOCOMOTIVE WORKS.—*Henry Vallee* elected president, succeeding *William F. Lewis*, who has returned to Alco Products, Inc., New York affiliate, as executive vice-president.

Products Reference 49A

)O YOU HAVE A BOMB N YOUR SHOP?



leplace it with a new EAGLE Oily Waste Can

isted and Labeled by Underwriters Laboratories, Inc. nd Factory Mutual for safe disposal of flammable wastes



'agle Oily Waste Cans will prevent fires re-ılting from solvent and oily waste, rags, wabs, shavings and other materials subject) spontaneous combustion. Cans come in two tyles—with and without foot lever. Large ne-piece lid enables user to dispose of bulky 'aste matter safely, easily. Triangular-haped for stability . . . strong steel construc-on. Come in 6, 10, 14 and 21 gal. sizes. Highest quality. Attractive pricing.

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Products Reference 49B



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RUGGED CM® HOISTS
FOR GENERAL SHOP USE AND REPAIR FACILITIES



CM LODESTAR
Electric Chain Hoists ...ideal for truck handling in spot car repair facilities and for general shop use. 1/8 to 2 tons. Hook or trolley suspension.



CM CYCLONE
Hand Chain Hoists...for shop service & maintenance. 1/4 to 10 tons. 1 ton weighs only 36 lbs.



CM PULLER
Ratchet Handle Hoists...a versatile tool to lift, pull, drag and stretch in car repair and shop maintenance. 3/4 to 6 tons. 3/4 ton weighs only 14 lbs.

CM® HOISTS

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Columbus McKinnon Corporation
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quality, dependability and safety for more than 75 years

save money... keep D.C. motors and generators running in top condition (without dismantling)

with IDEAL

FLEXIBLE ABRASIVES



Clean, burnish commutators while revolving. Non-dusting, non-conductive, non-loading. Remove damaging scum, dirt, grease — impart super finish for maximum operating efficiency. Fine grain abrasive in flexible bond, won't harm copper or "chocolate" film. 6 sizes for all needs.

and IDEAL

BRUSH SEATERS



Seat carbon brushes by touching to rotating commutator at brush heel, holding brush down. Released abrasive smoothes brushes, stopping damaging sparking. Also cleans small commutators and slip rings. Self cleans, won't scratch. 11 sizes in grades for all conditions.

For over 40 years IDEAL
has produced these and other Motor Maintenance Products famous for unvarying, top-quality uniformity—used and endorsed by the nation's largest companies. Complete facts on this Ideal line—specifically engineered to substantially reduce high repair costs with simple, low-cost prevention methods—are contained in Catalog Section 4.



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March, 1962

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1 2 3 4 5 6 7

ADVERTISEMENTS—Send more information on products advertised on Pages:
2 3 4 6 7 8 9 10 11-13 16-17 18 24-25 27
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49A 49B 50 51 52

Name ..... Title .....

Railroad .....

Company Address .....

City ..... Zone ..... State .....

Trade Publications

1. HUCK FASTENER TOOLS. *Huck Manufacturing Co.* 16-page catalog describes Huck line of fastener installation tools, Powerigs, and accessory equipment.

2. ELLIPTIC SPRINGS. *Pittsburgh Wire Form & Mfg. Co.* 4-page folder contains easy-to-use specification chart for ordering elliptic springs for railroad industries.

3. REEFER TEMPERATURE CONTROL. *Vapor Corp.* 2-page bulletin 4051 describes Reef-Air transistorized temperature control for refrigerator cars. Schematic diagram of system included.

4. FOUNDRY PRODUCTS. *Zenith Foundry Co.* 16-page booklet describes Zenith gray and ductile iron, alloy irons, and castings. Data includes specifications, mechanical properties and quality, sand and metal control procedures.

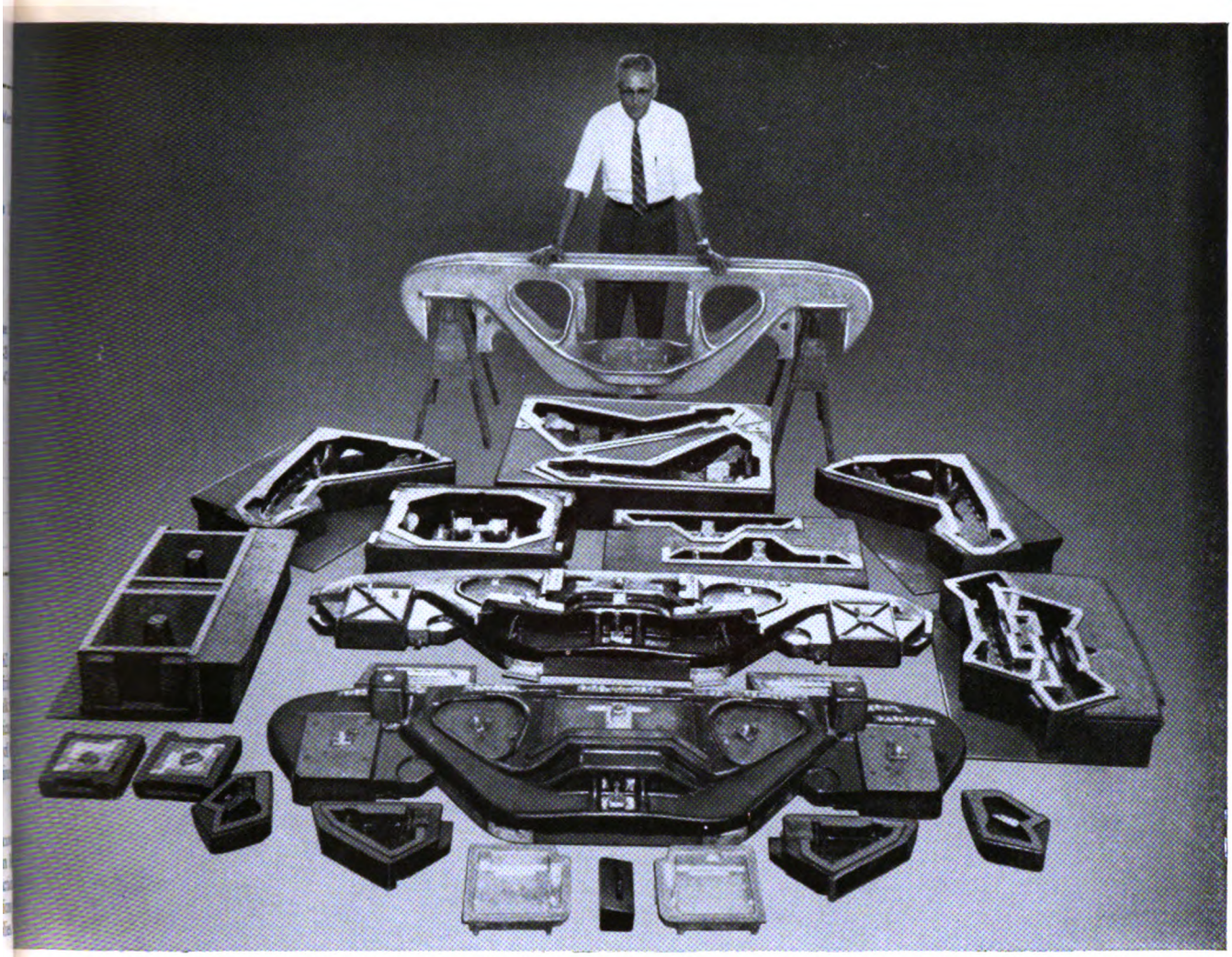
5. BOUNDARY FRICTION AND SOLID LUBRICATION. *Alpha-Molykote Corp.* 8-page Special Print No. 462 discu fundamentals of boundary friction lubrication solids. Based on talk prese as part of short course in lubrication neering at 1961 annual meeting of Amer Society of Lubrication Engineering Alfred Sonntag.

6. HOSE ASSEMBLIES. *Anaconda M Hose Div.*, Anaconda American Brass Bulletin TC-101R gives construction de properties, uses, and specifications on of Teflon Type T1 hose assemblies.

7. AIR STARTERS. *Ingersoll-Rand* "Go Modern, Start with Air" applic bulletin (Form 5094F) uses case studi show modern air starter installations cluding diesel and carbureted engines gas turbines. "Air Starter Selection (Form 5906) gives specifications, mou dimensions, recommended air starters specific engines, and recommended starters to replace specific electric st motors.

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Elmer Clements, superintendent of Symington's pattern shop, looks over a finished pedestal type side frame casting, together with the pattern and core boxes required for its production.

What It Takes to Make a Side Frame

'roducing the pattern for a railroad freight car side rame involves much more than translating dimen- ions from an engineering drawing. For example, nolten steel shrinks as much as ¼ inch per foot uring solidification. Also because cooling rates ary, it may twist or warp, requiring allowances to e made in the pattern and core boxes to produce n acceptable casting. The solution to these prob- ems is the direct responsibility of Symington's patternmakers, whose skillful art is the result of a minimum apprenticeship of 10,000 hours.

Symington's experience and integrity are your guarantee of premium-quality steel castings, whether they be truck side frames, bolsters, cou- plers, yokes or other components.

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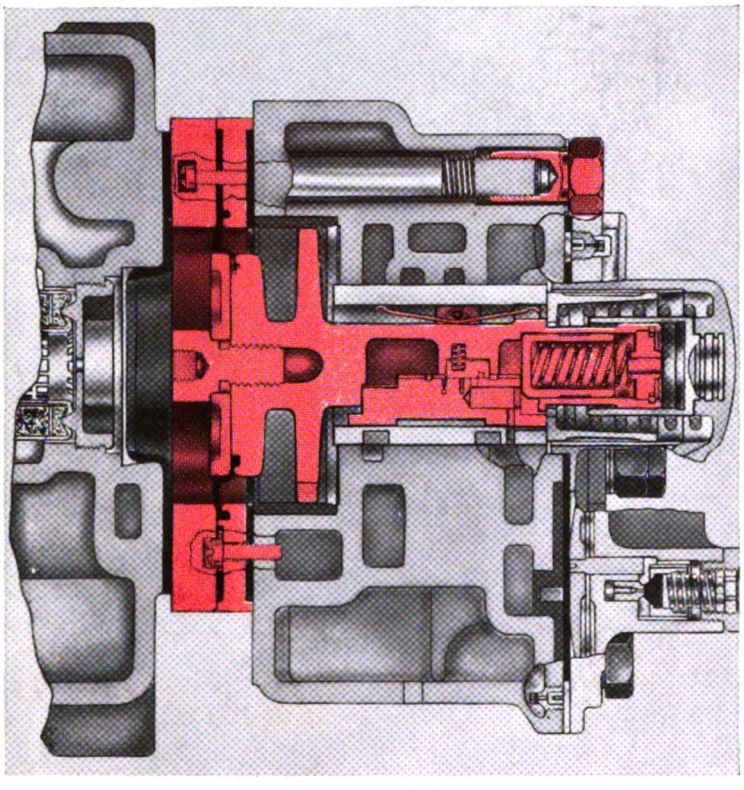
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CORPORATION
SYMINGTON DIVISION

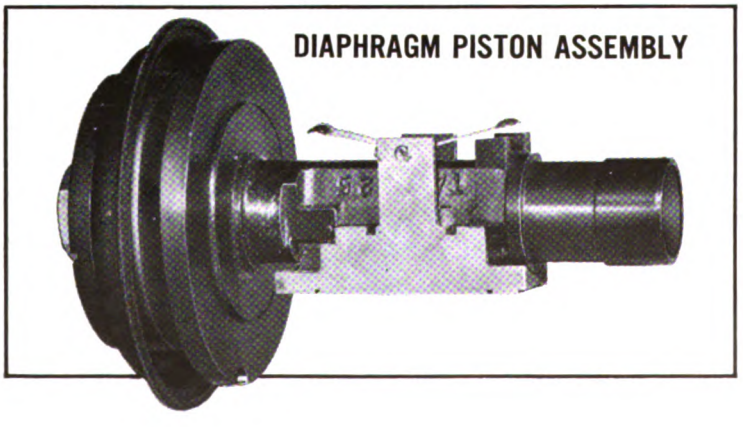
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To simplify maintenance and minimize stuck brakes in freight service—convert "AB" valves to diaphragm piston operation





The diaphragm piston for the "AB" servi portion eliminates the piston ring, solving t long-time problems developing from excessi ring leakage, and thereby increases operati reliability. With the diaphragm piston, skill hand fitting of rings is eliminated. In additi limit in bushing wear is increased and bushi service life correspondingly lengthened. C service bodies with feed grooves, previously ou moded, can be reclaimed for modern service application of the diaphragm piston.

Brakes on long freight trains will relea promptly when the diaphragm piston is use As usage of the new piston increases, frequen of stuck brakes will diminish. This improv performance can be attained with only a mod investment in these new conversion kits.

Westinghouse Air Brake specializes in R Manufacture of "AB" valves. This progra embraces application of the diaphragm pist at an attractive cost. For any "AB" main nance program, substitution of the diaphrag piston at C.O.T.&S. periods is desirable.

Your nearest Air Brake Division Represent tive will be glad to develop with you the mo advantageous method of incorporating th progressive step in your repair program.

Westinghouse Air Brak
COMPANY
AIR BRAKE DIVISION WILMERDING, PENN

M-U Commuter Cars for NYC

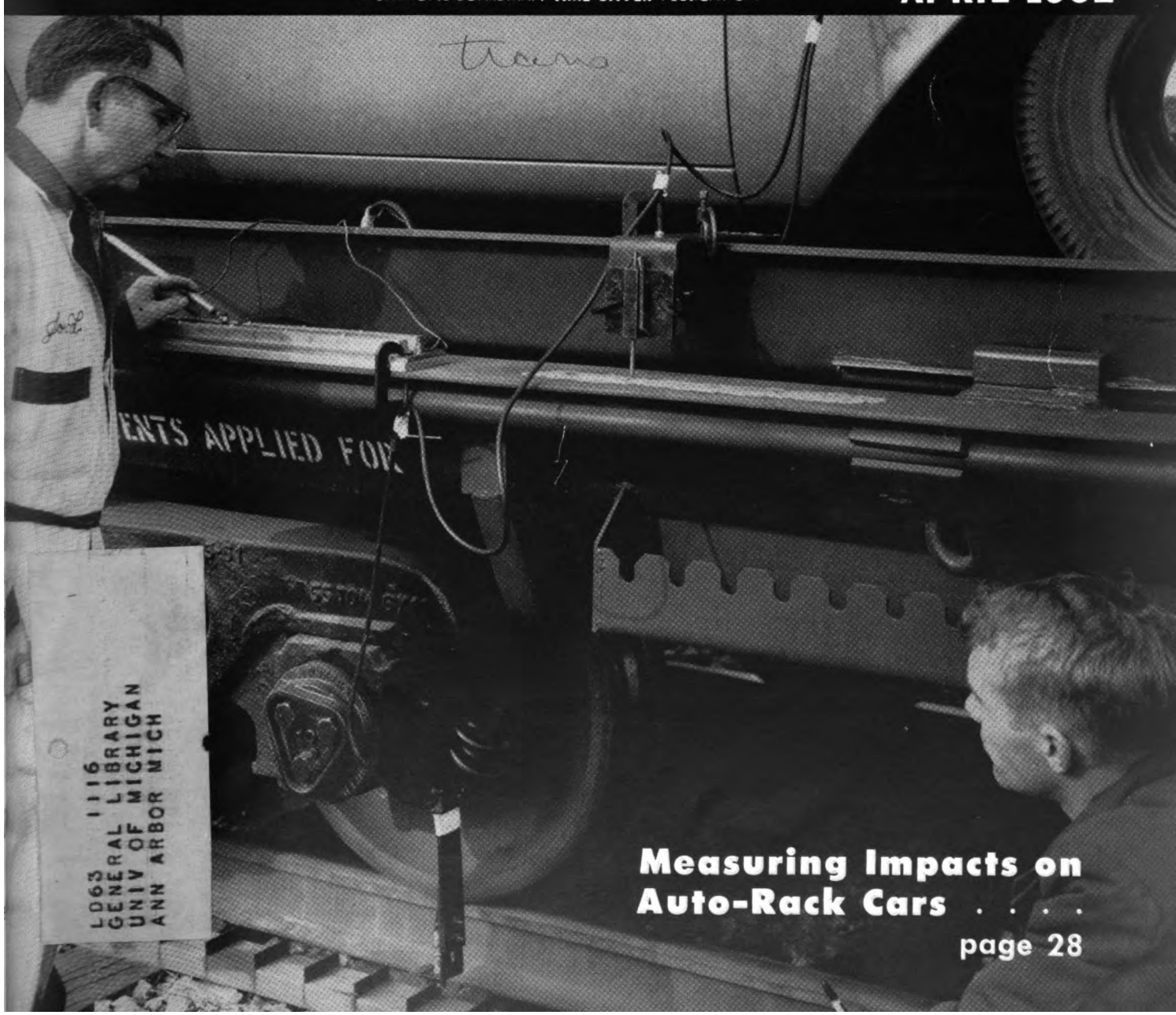
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L&N Tests 100-Ton Hoppers

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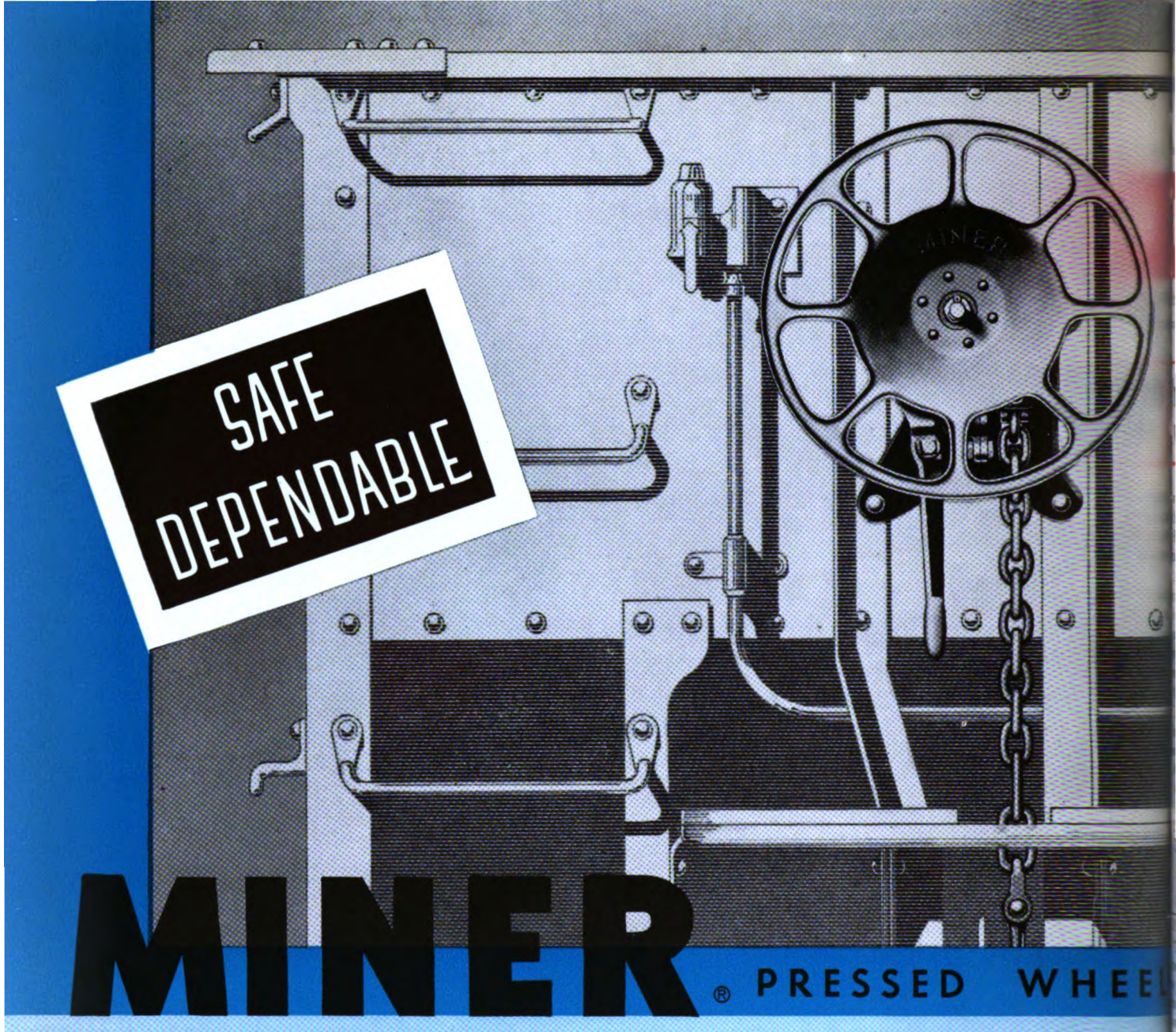
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Measuring Impacts on Auto-Rack Cars . . . .

page 28



MINER® PRESSED WHEEL

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power hand brake

The mechanical principle employed in this brake provides ample power with maximum safety and speed of application. Braking load is held at any position automatically and can be gradually or fully released with little effort by merely turning the wheel. This exclusive feature for holding the load at any point receives the enthusiastic endorsement of all brakemen. Quick release, WITHOUT ANY RECOIL OR BACKWARD SPIN of the hand wheel, is effected by pulling the full release handle. The brake is lubricated, and is entirely enclosed to give protection from the weather.

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W. H. MINER, INC. CHICAGO

OFFICE OF FOREIGN OPERATIONS

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Vol. 5, No. 1



Railway Executive News

Published by Railroad Products Division, SERVO CORPORATION OF AMERICA

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111 New South Road • Hicksville, Long Island, New York

President 'Much Pleased' with Wheel Checkers

How well do Wheel Checkers work? Read the following excerpts from a letter from the President of Kentucky & Indiana Terminal Railroad Company, Louisville.

"...the Wheel Checkers...installed on this railroad have met every possible test, and we are very much pleased with their operation. As a matter of fact, in 1960 the approximate total of cars moving over the three installations totaled 524,424.

"Of this number of cars, we had a total of 115 times the checkers were activated. I list below the different defects as we found them on close inspection:

14 broken flanges
4 loose wheels on freight equipment
1 loose wheel on passenger equipment
15 sand pipes dragging
73 brake beams down, brake shoe keys missing, brake hanger pins missing, etc.
8 other miscellaneous
115 total

"The maintenance on the broken flange detectors has been very reasonable, and we feel that the installation has been exceedingly helpful to us. These installations are all located on main line tracks leading into the Yard."

Carroll W. Ashby
President & General Manager
KENTUCKY & INDIANA TERMINAL RAILROAD COMPANY

New 'Hot Box Headquarters' Opened By Servo Corp.

A new "Hot Box Headquarters" has now been established at the Hicksville, L. I., N. Y., headquarters of the Railroad Products Division, Servo Corporation of America.

According to Division General Manager W. P. Morrison, the new Hot Box Headquarters will embrace the SERVOSAFE® Hot Box Detective* Training School, in operation for more than five years, a new Information Center, and an Engineering Force.

Railroads using the Detective system send their personnel to the Hicksville plant for an intensive week-long course. Students are taught to operate, maintain, service, and trouble-shoot all components of the Hot Box Detective system. They become thoroughly familiar with the system's modular design, making it easier for the railroads to establish effective maintenance procedures.

From the Information Center, railroads are able to obtain detailed data on hot box interpretation, detection, and performance of the SERVOSAFE Hot Box Detective system.

The Engineering Force is staffed by experts on the technical aspects of this most effective method of protection against the hot box hazard.



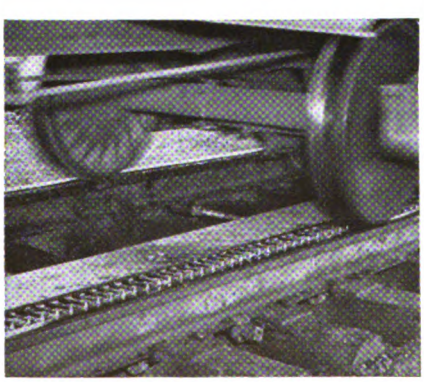
Hot Box Headquarters specialist is shown conducting regional seminar at central point for one major Eastern railroad.

This group of hot box specialists regularly conducts regional and local seminars among various railroad management and operating groups to get to the heart of the railroads' No. 1 operating problem. They will be happy to schedule such a session for your road.

Meanwhile, Hot Box Headquarters has just published a new Technical Bulletin on SERVOSAFE Hot Box Detective systems. Write for a free copy.



System automatically detects bad wheels on passing cars, squirting a shot of non-drying bright yellow paint on wheel for quick identification. An automatic alarm system is also available.



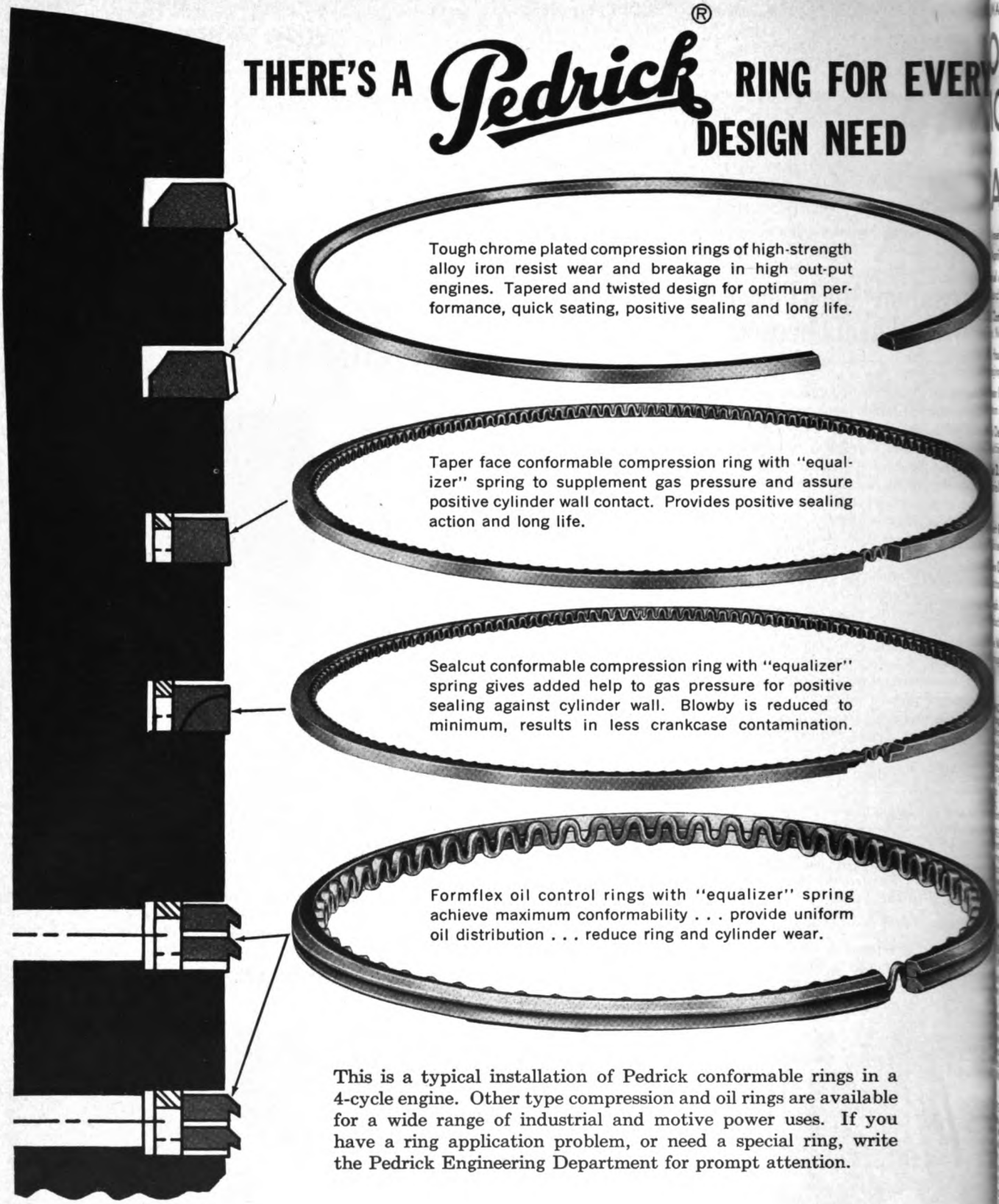
124 chrome-plated spring-steel fingers feel every inch of each wheel flange to insure against defects.



Broken wheel flanges and loose wheels are easily detected. — Servo Corp. has exclusive worldwide sales right for Wheel Checkers system.

*Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857, and 2,963,575. Other U.S. and foreign patents pending.

THERE'S A Pedrick® RING FOR EVERY DESIGN NEED



Tough chrome plated compression rings of high-strength alloy iron resist wear and breakage in high out-put engines. Tapered and twisted design for optimum performance, quick seating, positive sealing and long life.

Taper face conformable compression ring with "equalizer" spring to supplement gas pressure and assure positive cylinder wall contact. Provides positive sealing action and long life.

Sealcut conformable compression ring with "equalizer" spring gives added help to gas pressure for positive sealing against cylinder wall. Blowby is reduced to minimum, results in less crankcase contamination.

Formflex oil control rings with "equalizer" spring achieve maximum conformability . . . provide uniform oil distribution . . . reduce ring and cylinder wear.

This is a typical installation of Pedrick conformable rings in a 4-cycle engine. Other type compression and oil rings are available for a wide range of industrial and motive power uses. If you have a ring application problem, or need a special ring, write the Pedrick Engineering Department for prompt attention.

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ENGINE PARTS DIVISION

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April, 1962—Vol. 136, No. 4
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OSTMASTER—SEND FORM 3579 TO EM-IETT ST., BRISTOL, CONN.

REPORT FOR APRIL

Southern Planning 200-Ton Coal Cars

Acquisition of ultra-high-capacity freight cars is planned by the Southern. Some 200-ton coal cars are to be ordered by the railroad "in the next few months," D. W. Brosnan, Southern president, testified at a recent rate hearing. "We have on our drawing boards today cars of 150-ton and 200-ton capacity," he said. Cars of these capacities are to be utilized for movements of grain and other products as well as coal. "We expect to continue to exploit the dynamics of railroading as can be expressed in higher-weight-carrying capacities of these light-weight cars," Mr. Brosnan concluded.

Since the Southern put its high-capacity aluminum gondolas (RL&C, April 1960, p 27) and covered hopper cars (RL&C, June 1960, p 93) in service, these cars have proved even more satisfactory than Mr. Brosnan had dared hope. They have been doing the job for which they were designed —stopping the diversion of bulk commodities to other modes of transportation. "We will never have any coal pipelines in our territory," says Mr. Brosnan.

It is reported that the proposed Southern coal cars will have no center sills and are to be fitted for extremely rapid unloading. They were designed in cooperation with an aircraft builder, and the design is currently under study by commercial car builders.

RRs Should Have Right To Make Technological Changes

Railroad managements should have the uncontested right to introduce technological changes following negotiations on applicable work agreements, if necessary, and with certain protection for displaced employees, the Presidential Railroad Commission concluded recently. This was the recommendation of the group on one of four areas of controversy between the nation's carriers and their operating employees. The Presidential Commission, appointed in 1960 to consider unresolved questions over manning of trains, technological change, compensation, and employee assignment, concluded its studies a month ago.

"Technological change and adjustment to change are not new in this industry," the Commission said. "Railroad service was born out of a technological breakthrough—the marriage of a steam engine to carriage on rails. . . . Today's impasse does not serve the interests either of the railroads or of the employees. It does not serve the public interest. To obstruct technological advance is to give the public a poorer transportation system, to hobble the railroads in their competition with other modes of transport, and to reduce employment opportunities of all employees. To embrace technological advance without adequate protection for those displaced may seriously disrupt many lives.

"The public interest requires this issue be resolved. We have by no means seen the end of technological and economic changes as they affect the industry. . . . Other improvements lie ahead. New forms of power are on the roads or are being tested; new modes of containerization and materials handling are coming to the fore. The prospect that coal can be economically shipped by pipeline has evoked a search for a technological answer in railroad terms. It is even conceivable, and on some runs perhaps likely, that progress in automatic controls will bring the day of the unmanned train. . . . Technological advance is a public blessing. The task is to make sure it is not a private curse."

On the manning of locomotives, another point of controversy, the Commission concluded that "fireman-helpers are not so essential for the safe and efficient operation of road freight and yard diesels that there should be either a national rule or local rules requiring their assignment on all diesels." Canadian railroads have operated on this basis for two years.

Along with their other statements on the essentiality of firemen's duties, the organizations placed considerable emphasis on the mechanical functions performed by the fireman "in the maintenance of power," es-

(Continued on page 40)

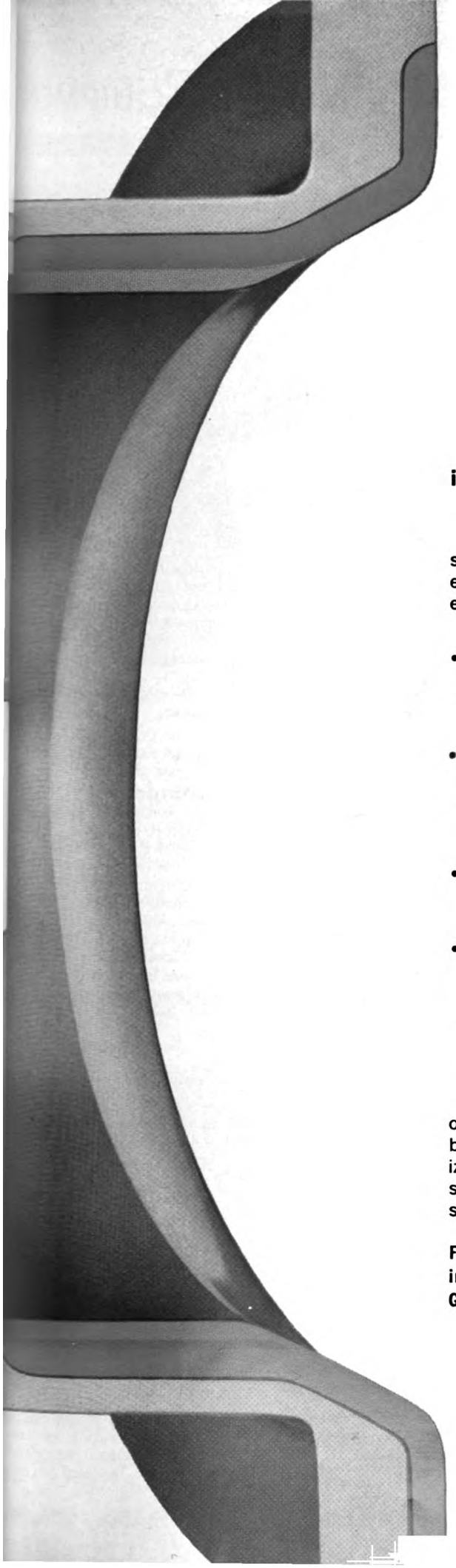
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50% Longer Flange Life



New Electro-Motive Flange-Lubricated Traction Motor Support Bearing

an exclusive design now available at no increase in cost as part of EMD's new bearing conversion plan.

Fifteen years of research, laboratory and field testing have resulted in Electro-Motive's new controlled lubrication bearing, an exclusive design which provides 43% increased oil capacity, lengthening miles between refills, and 50% longer flange life.

- New narrow window wick utilizes newly developed, high-capillary-action one-piece felt which delivers uniform oil film to the journal surface, lowering operating temperatures, extending bearing life.
- Full flange lubrication is provided by four felt flange lubricators which gather and transmit oil to the flange face. Lateral movement of the axle or traction motor automatically applies the correct amount of oil to the wheel or gear hub.
- Reduced oil consumption is the result of a narrow window opening which virtually eliminates splash loss.
- Increased bearing capacity is made possible by thirty-three square inches of bearing surface added to the new unit, and movement of the window out of the lower load zone for extra bearing area and support.

NEW ELECTRO-MOTIVE CONVERSION PLAN

Now you can trade in worn traction motor support bearings and other brass scrap on new Electro-Motive flange-lubricated bearings by taking advantage of EMD's new conversion plan. The plan utilizes a straight weight conversion of worn bearings or equivalent scrap brass for new Electro-Motive flange lubricated traction motor support bearings at no increase in cost.

For complete information on the new EMD traction motor support bearing and bearing conversion plan, write Electro-Motive Division, La Grange, Illinois, or contact your nearby Electro-Motive Representative.

GENERAL MOTORS LOCOMOTIVES

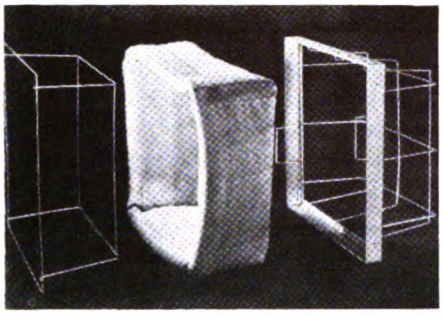
GEARED TO PRODUCE R P I

ELECTRO-MOTIVE DIVISION
GENERAL MOTORS · LA GRANGE, ILLINOIS
HOME OF THE DIESEL LOCOMOTIVE
In Canda: General Motors Diesel Limited, London, Ontario.

Paint Stripper

Paint, lacquers, sealers, or adhesives can be removed from aluminum, magnesium, steel, or other metals with Sprazee, a non-flammable liquid paint stripper developed for use on all types of railroad equipment. The stripper can be applied by spray, brush, flow-on, or dip methods. It contains evaporation retarders to extend stripping life, yet is easily flushed off with water. Wyandotte Chemicals Corp.

For more information, circle 4-1 on the coupon on page 46.



Disposable Filters

The Ulok cube air filter is shaped like an open box with slightly tapered sides. It has four units—inside retainer; cube shaped Dynel Modacrylic filter media; standard holding frame, permanently fastened in duct, and outer retainer. According to the manufacturer, it can be used at higher air volumes than other filters of the same face area without loss of efficiency. No oil is required. Union Carbide Development Co.

For more information, circle 4-2 on the coupon on page 46.

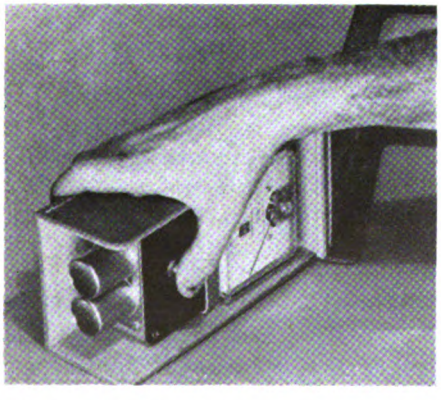


Photo Tachometer

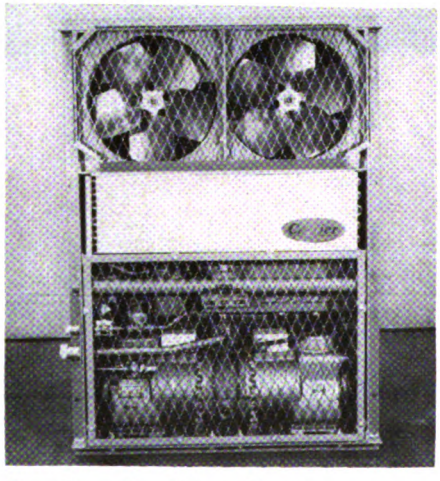
The "electric eye" tachometer is a self-contained, hand instrument which operates on its own transistorized power-pack without electrical or mechanical connections. It operates with the press of a button. Through a beam of light aimed at the moving part speeds from 0 to 12,000 rpm can be read on the meter scale. James G. Biddle Co.

For more information, circle 4-3 on the coupon on page 46.

Microbicide

A boron composition, a microbicide, has been railroad tested and found effective for killing the fungi and bacteria in diesel fuels which cause corrosion, filter plugging, and water emulsification. Small quantities of the compound can be blended directly into the fuels to protect both wayside and locomotive fuel systems. The Standard Oil Company of Ohio has been using a similar boron compound in one fuel for over seven years and reports that the handling system for that fuel is still completely sterile. United States Borax & Chemical Corp.

For more information, circle 4-4 on the coupon on page 46.



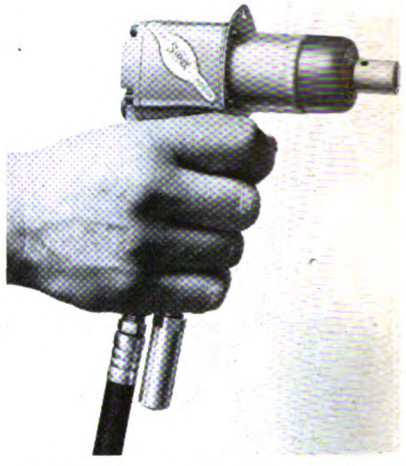
Reefer Cooling System

An electrically activated cooling system for refrigerator cars is said to maintain any desired temperature from 30 to 70 deg F even when outside temperatures exceed 100 deg F. The refrigeration section of the two piece reefer assembly can be installed in the insulated walls of a car so it is flush with the interior wall. The exterior part of the unit extends only 3 in. beyond the outside wall. The air handling part is inside and at the top of one end of the car. Bunkers are eliminated and cargo capacity is said to be increased by 22% when the system is used to convert ice-bunker cars. Carrier Corp.

For more information, circle 4-5 on the coupon on page 46.

Impact Wrenches

Positive camming action with guided impact is said to make the No. 473 (⅜-in. square drive, $^{5}/_{16}$-in. bolt capacity) and the No. 474 (½-in. square drive, ⅜-in. bolt capacity) Sioux air-impact wrenches more suitable for use on applications requiring soft draw up. An operator-designed handle and motor housing is especially contoured to fit the hand. The wrench can be controlled with the one hand that operates it. Albertson & Co.

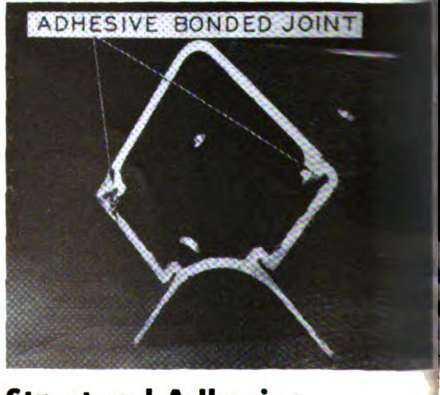


For more information, circle 4-6 on the coupon on page 46.

Dipping Compound

Electrical and mechanical components, transformers, motors, etc., can be immersed in liquid Epocast H-E-1827 and withdrawn completely and uniformly coated, according to the manufacturer. Sharp edges and abrupt surface changes are also coated satisfactorily. The compound cures at 250 deg F in 4 to 5 hr, or at 200 deg F in 7 to 8 hr, average cured thickness being .009 to .01 in. Furane Plastics Inc.

For more information, circle 4-7 on the coupon on page 46.



Structural Adhesive

The paste type consistency of the 3M adhesive EC-2086, which, it is said, will not run or flow during heat curing operations, permits structural bonding of loosely fitting parts. The adhesive is designed for metal

onding applications subjected to service emperatures of from minus 70 to plus 00 deg F. It contains a heat-activated ardener. Average shear strengths are in ie range of 5000-6000 psi at room temperture and 4800-5800 psi at 180 deg F. Bend rength at 75 deg F is 250 lb. Two self-ocking extrusions bonded with this one-art epoxy resin adhesive are being used by ie Budd Co. to assembly aluminum corner osts of large bulk containers. Fabricating ost is said to be 50% below a previously sed welding process. Minnesota Mining Manufacturing Co.

For more information, circle 4-8 on the oupon on page 46.



iteam Cleaner

he Model "1550" Hypressure Jenny steam leaner is said to have twice the cleaning npact of the "1250" which it replaces; 5% greater pump capacity (150 gal per r); a new work-ease swivel cleaning gun, nd a new ordorless fume-free burner. It available in six different oil-fired or gas-red models and with a choice of ten op-onal features or accessories. Homestead alve Manufacturing Co.

For more information, circle 4-9 on the oupon on page 46.



lectric Wrench for Multi-Rack Auto Carriers

he CP-991 wrench is a one-man tool or raising and lowering the decks of multi-ack automobile carriers. It is designed for ll-weather operation with 115 or 230 volts, -c or d-c. Time required for lifting two ully loaded overhead racks is said to be ess than 7 min. Chicago Pneumatic Tool Co.

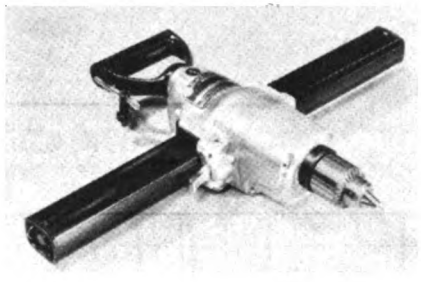
For more information, circle 4-10 on the coupon on page 46.



Wheel Carrier

The transfer of complete locomotive or car wheel assemblies has been facilitated on the Toledo, Peoria & Western through the use of a wheel carrier designed jointly by the railroad, Platt, Inc., and Wheels, Inc. The platform, of diamond-steel plate, is mounted on a standard truck chassis. It slides backward on runners, and then tilts at a slight angle. Standard width tracks are built right on the platform. The 5-ton Tulsa winch between the framework of the chassis can be reeled automatically from the front of the body over the drum system and slide out to the rear where it can be hooked onto the complete wheel assembly. With gears set in reverse the wheel assembly rolls up the track and is locked in place at any of four specially designed chucks. The hoist system on the body can move 10 tons. Forward and underbody compartments accommodate oxygen and acetylene tanks, hoses, and other equipment needed to repair wheel assemblies right on the job. Normal crew is two men, but one man can operate the carrier in an emergency. Wheels, Inc.

For more information, circle 4-11 on the coupon on page 46.



Cordless Tools

The conventional cord and electrical outlet on the job are eliminated in the design of four cordless electric drills—the ¼-in. Holgun drill; the ⅜-in. Scru-Drill; the ⅜-in., 2-speed drill, and the ½-in., 2-speed drill. The motor, of new design, according to the manufacturer runs quietly and smoothly and is not harmed by overloading or stalling. A silver-cadmium industrial Power Pack inside the handle of each tool is a self-contained energy source. The pack, it is said, can be fast charged a minimum of 400 times with the charger that comes with each unit. Black & Decker.

For more information, circle 4-12 on the coupon on page 46.

Dye Penetrant

Surface and open sub-surface defects in most metals, magnetic or non-magnetic, and in other non-porous materials can be located with Chex-All, a dye penetrant which can be used before or after any processing operation. After excess penetrant is cleaned from a surface, the part is sprayed with an even white coat of the developer which draws the penetrant up from the cracks, forming red stains on the white surface. The material is sold in bulk, or in a tool box type carrying kit which contains two Penetrant, two Developer, and four Cleaner spray cans. Sperry Products.

For more information, circle 4-13 on the coupon on page 46.

Solvent-Type Cleaner

When sprayed on upper deck surfaces and allowed to remain for 15 or 20 min, the No. 705 Crankcase and Upper Deck nonchlorinated cleaner is said to soak away all grime, sludge burned-on carbon and varnish deposits. It is said to be particularly suitable for use in partial tear-downs and Class II or low mileage maintenance of diesel locomotives. It does not attack paint and may be used to clean brush holders, injection nozzles, pistons, or other working parts in soak-tank or flush operations. Toxicity is low. Lix Corp.

For more information, circle 4-14 on the coupon on page 46.

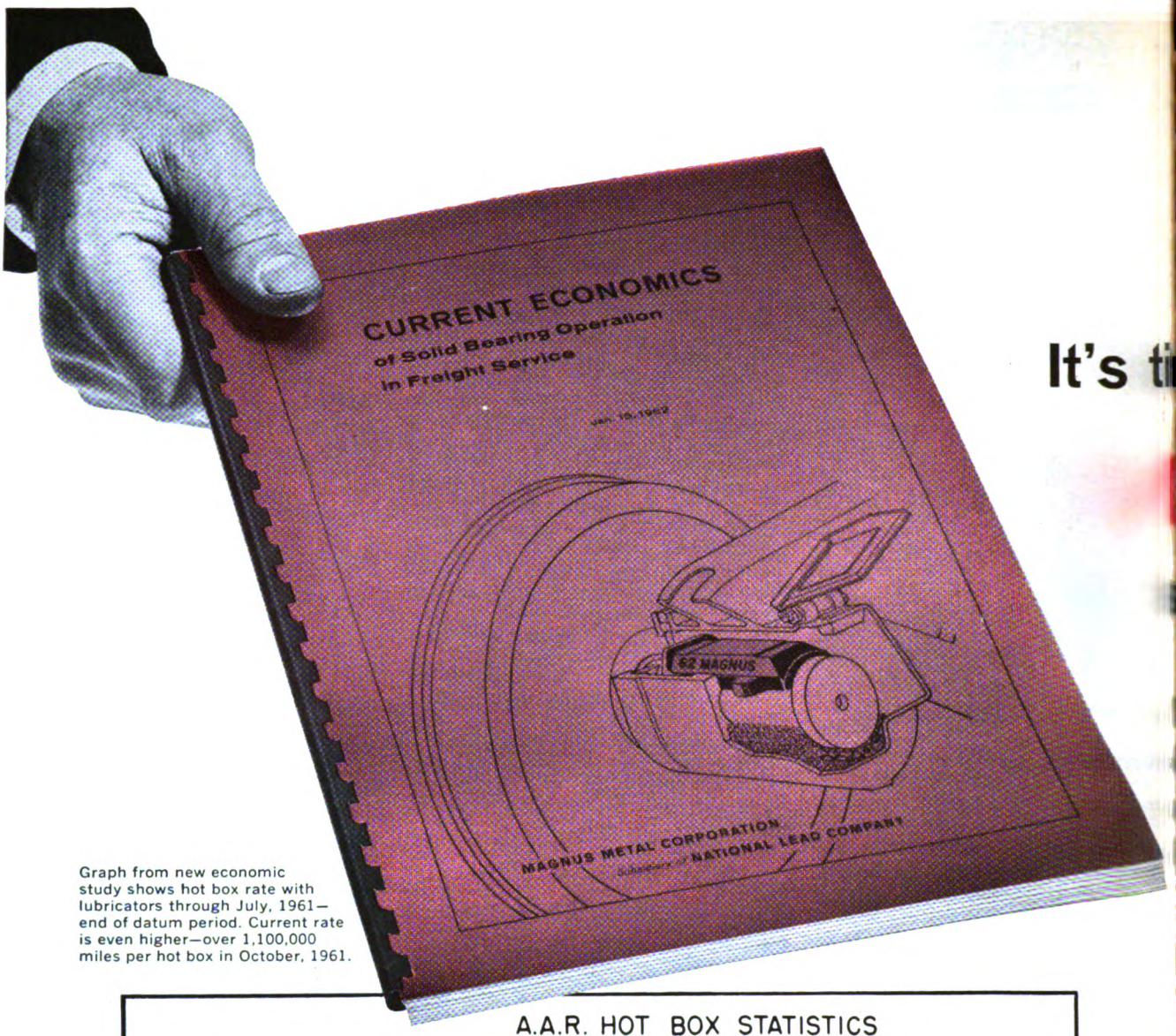


Flat-Car Bridge Plate

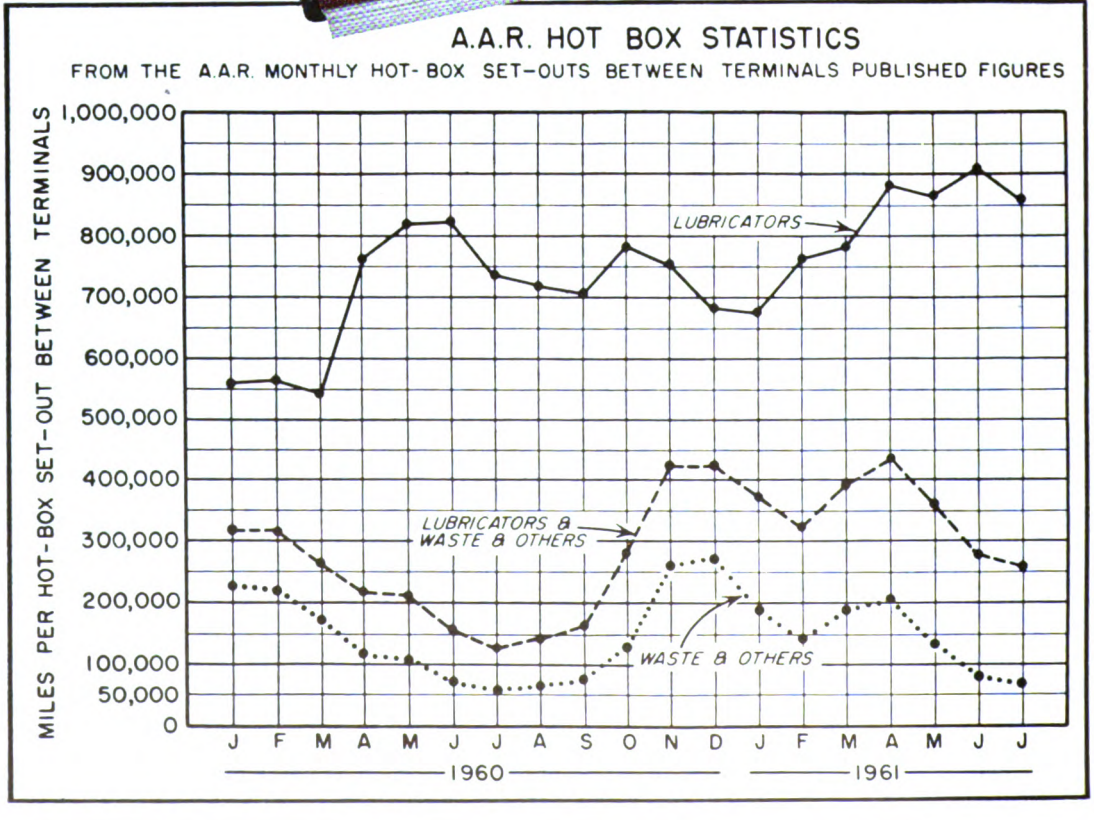
Eighty-two-pound bridge plates, fabricated of Alcoa aluminum, are said to be much easier to handle than the 160-lb steel bridge plates used on many piggyback flat cars. The aluminum plates are assembled with Huck aluminum fasteners. They will support all legal truck-trailer loads. Sterling-Detroit Co.

For more information, circle 4-15 on the coupon on page 46.

(Turn to page 44)



Graph from new economic study shows hot box rate with lubricators through July, 1961—end of datum period. Current rate is even higher—over 1,100,000 miles per hot box in October, 1961.



take a

NEW LOOK

at solid bearing performance and costs

Today you operate solid bearings with lubricators for less than half the cost with waste packing in 1955— and you own and operate solid bearings in freight service for less than the cost of merely owning roller bearings.

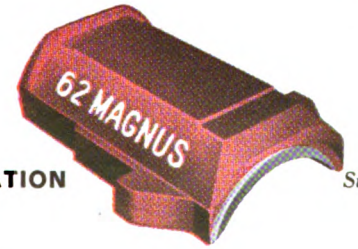
Here's a brand new study of solid bearing economics —an updating of operating costs using the same method as the AAR in Mechanical Division Report 20000. It reflects the tremendous improvement in solid bearing performance made possible by lubricator pads and other engineering changes since 1955 —the date of the AAR report. And total costs have been cut in half despite significant increases in wage rates and material costs. Some of the findings:

1. **CURRENT PERFORMANCE DATA**
   Freight cars equipped with solid bearings and lubricating devices now average only one set-out per 850,000 car miles. That's only one set-out per 54.05 car years.
2. **CURRENT SOLID BEARING OPERATING COST**
   Labor and material maintenance for solid bearings with lubricators now costs $40.86 per car per year, compared to $82.15 as determined by the AAR in 1955.
3. **COMPARATIVE ECONOMICS OF SOLID VS. ROLLER BEARINGS**
   The entire annual cost of *owning and operating* a solid bearing car with lubricators in freight service averages $11.85 *less* than the cost for just *owning* a roller bearing car.

All this and more you'll find in Magnus' new economic study. It's complete with detailed cost tabulations. A copy is yours for the asking. Just write to Magnus Metal Corporation, 111 Broadway, New York 6, or 80 E. Jackson Boulevard, Chicago 4.

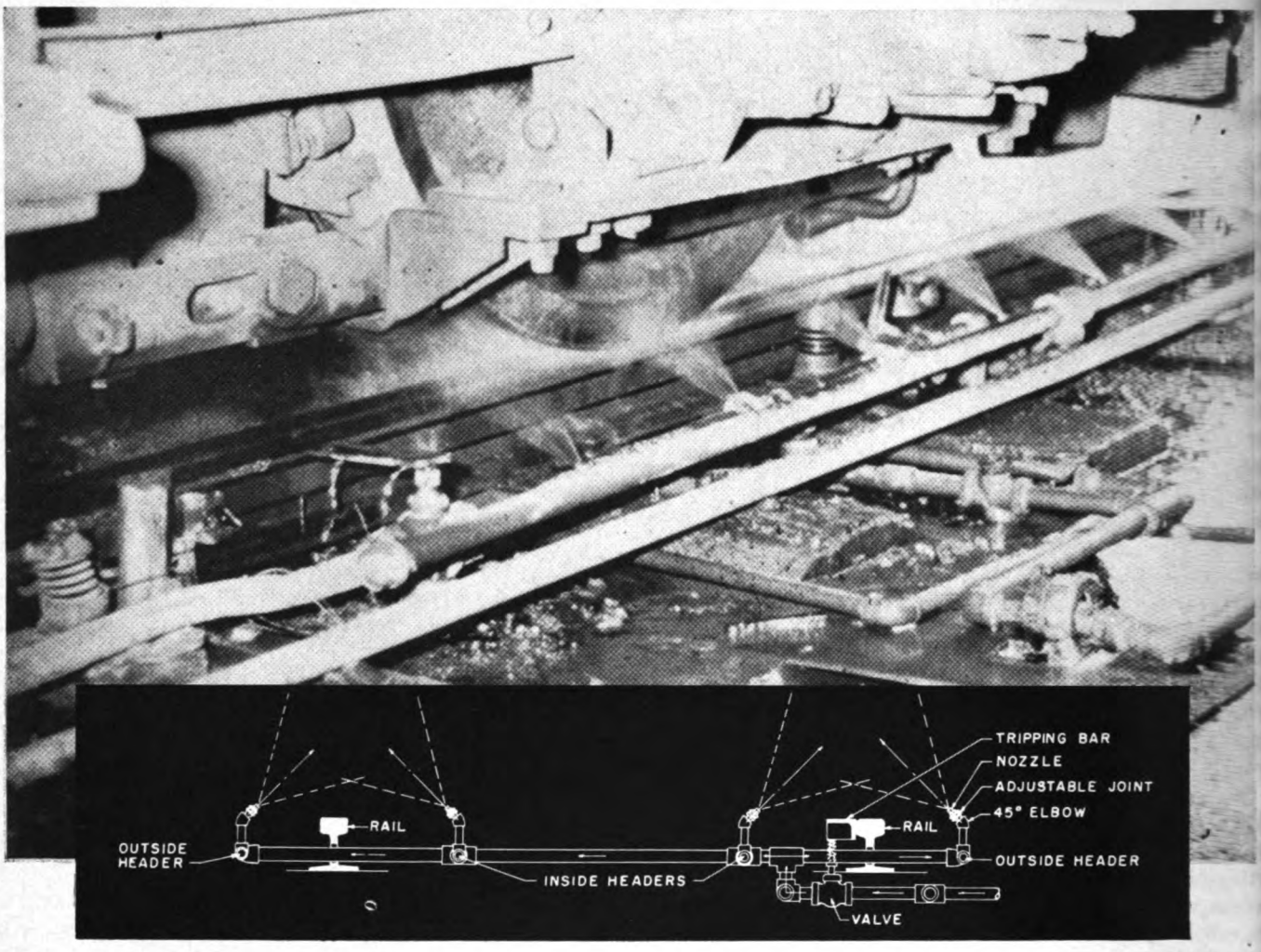
MAGNUS

SOLID BEARINGS



MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Oakite adds more POWER to your MANPOWER



...simple setup cleans diesel wheels automatically

This Oakite automatic wheel-cleaning system makes things a lot easier for your clean-up crew—relieves them of tedious, time-consuming work. Charged with a solution of Oakite 120, it automatically removes oily, sticky soil and road dirt . . . leaves wheels completely clean for quick inspection. This modern Oakite mechanized method is bound to show a net savings for your road.

By boosting the cleaning power of your available manpower, Oakite materials and methods like these give you the *important* advantage: LOW-COST END RESULTS. Ask the Oakite man for engineering drawings and details. Or write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

OAKITE

SCIENCE

over 50 Est. 1909 years' leadership in industrial cleaning

EDITORIALS

Freedom of Expression

There is some talk of the possibility of merging associations serving the mechanical department. We hope that any move in this direction will not curtail the worthwhile contributions made to the industry by the four railroad groups known as the Coordinated Associations.

Over the years these associations have done a very fine job in serving the railroads. The annual September session is considered by both railroad and railroad supply men to be one of the best, if not the best, of all railroad conventions. This reputation has been earned not only because of the consistent high quality of the programs presented at the meetings but also because of the freedom of expression exhibited during the important discussions of the committee reports.

This willingness on the part of those attending the Coordinated meetings to discuss freely their ideas and their experiences is what helps to make the discussions so valuable. It is why these associations contribute so much to the industry. It is the very essence of their existence. Without this freedom of expression their ability to contribute to the progress of the railroads would be seriously impaired. Any move that would restrict this freedom would adversely affect the industry.

The members of these associations are dedicated men. They have one purpose in mind—to increase their knowledge and thereby promote the industry they serve. They are men who know the equipment for which they are responsible; they know the operating problems; they know the responsibilities of the men who keep traffic on the rails. The interchange of ideas between these men is of prime importance to the railroads and there are no better forums than those provided by the Coordinated associations.

We believe these associations should continue as independent groups. They are not policy makers. They are the down-to-earth men that the railroads depend on to keep the traffic moving and keep the raidroads in a position to meet the competition. They should be free to express themselves.

Cutting the Dead Weight

The Louisville & Nashville and the Southern are each considering designs of cars with carrying capacities up to 200 tons. Even if it develops that present economics, materials, and design techniques would make freight cars of somewhat lower capacities most practical right now, it is apparent that car designers will be undergoing pressure to produce models which will carry extremely high payloads. This means that there will be growing emphasis on reducing the weight of the car.

Drastic weight reductions in freight cars are probably possible either by using advanced design techniques or by utilizing completely new materials. The design of extremely lightweight freight-car structures, using either conventional or new materials, is complicated by the absence of adequate mathematical approximations of all the forces developed in a freight car during switching and over-the-road train operations. As a car structure is lightened, there can be a drastic reduction in its ability to absorb extremely high dynamic loads. While most of today's freight cars are adequately designed from a static standpoint, practically all of the damage to which they are subjected is the result of dynamic loading. It is important that mathematical methods be developed for calculating the dynamic forces involved, so that each new car design need not be followed by impact testing of a full-scale prototype. Not only can testing of a prototype car slow subsequent production, but it also adds considerably to the engineering costs involved.

Because there may be no solution to the problem of limiting deflection in lightweight structures of the commonly accepted car-building metals, it may well be time to consider the use of materials other than steel and aluminum. At last November's AAR and Armour research symposium (RL&C, September 1961, p 5), it was pointed out that ceramics and metal-ceramic composites have a specific stiffness seven times that of either aluminum or steel. This means a beam constructed of a material such as boron carbide, while providing the same degree of stiffness or resistance to deflection under load, would weigh only one seventh as much as a beam of steel, aluminum, magnesium, or titanium having the same depth. Although ceramics are characterized by extreme brittleness, comparatively poor tensile properties, and an absence of weldability in the conventional sense, Armour Research Institute is currently working on techniques for using these materials in beams. It has been proposed that beams composed of ceramic segments tied together with pre-stressed steel "tendons" might find application in railroad car construction. It would be possible to incorporate reasonable impact-absorbing capacity utilizing materials that have exceptional compressive strength. Together, these would produce a substantial weight saving. Such a radical proposal could be of increasing importance as the loaded weights of proposed cars approach the limits of the highest practicable axle loadings.

Coordinated Meetings

The Coordinated Associations will meet September 16-19, 1962 at the Hotel Sherman, Chicago, not on September 13-16 as reported on this page in our March issue. No exhibits will be held in conjunction with the meetings of the four groups: Air Brake, Car Department Officers'; Locomotive Maintenance Officers' and the Railway Fuel and Operating Officers' associations. The Allied Railway Supply Association will have entertainment for ladies on Monday and Tuesday afternoons and for all during the evenings of those two days. It will also arrange for the annual luncheon on Tuesday, September 18.

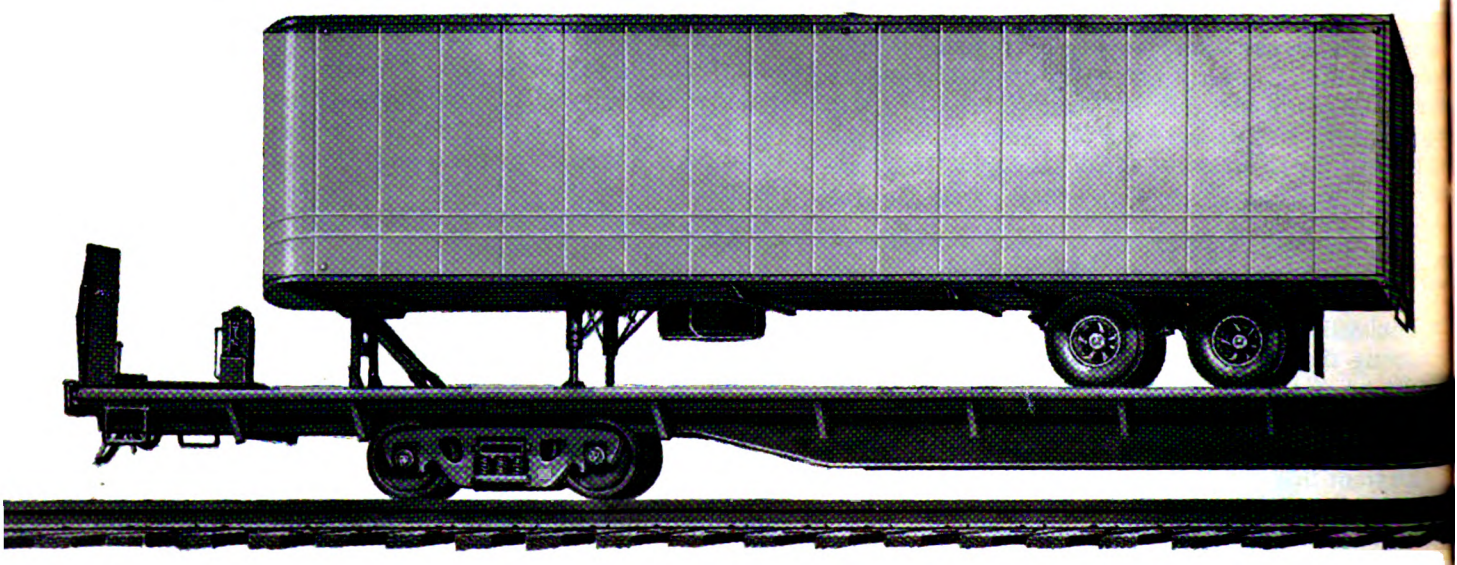
Over 10,000 locomotives and cars are

COBRA Shoes have been on the market for just a little over seven years . . . and already 173 different railroads and private car operators have applied them to their equipment.

Obviously such acceptance must be based on the COBRA Shoes proved performance in service. For example, in high-utilization service, COBRA Shoes have been widely accepted. More than 2,000 piggyback cars are now operating with COBRA Shoes. Here are reasons why COBRA Shoes are used on over 10,000 cars and locomotives.

1. COBRA Shoes last 4 to 5 times longer than cast iron shoes. In commuter service, the resulting monetary savings in many cases are sufficient to *amortize all conversion costs in less than a year.*

2. COBRA Shoe equipped cars have obtained up to *twice the wheel life* of cars using cast iron shoes. It is characteristic of COBRA Shoes that the rate of wheel wear is less and the distribution of wear is



THE COBRA SHOE . . . a product of the combined research facilities of **WESTINGHOUSE AIR BRAKE**

now in service with COBRA® SHOES!

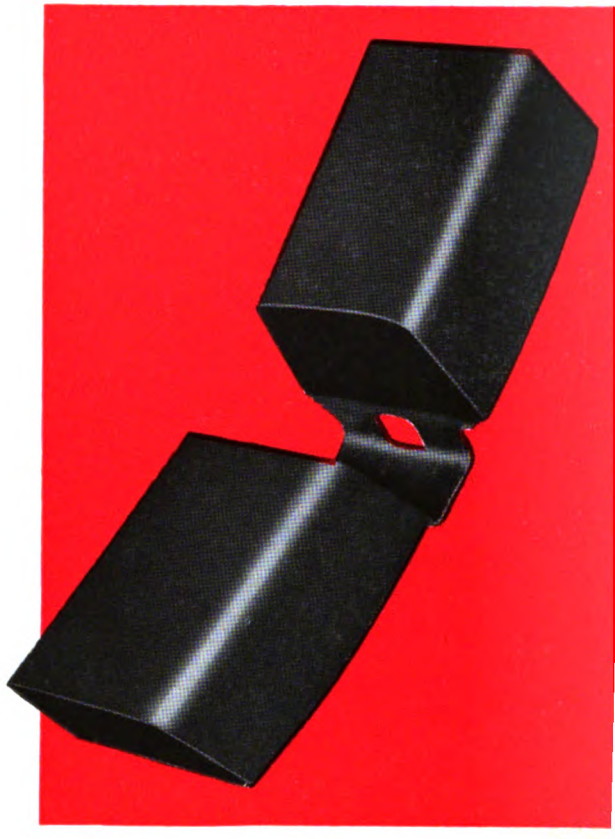
such that the original wheel contour is closely maintained. In addition, there are fewer wheel renewals for thermal cracks.

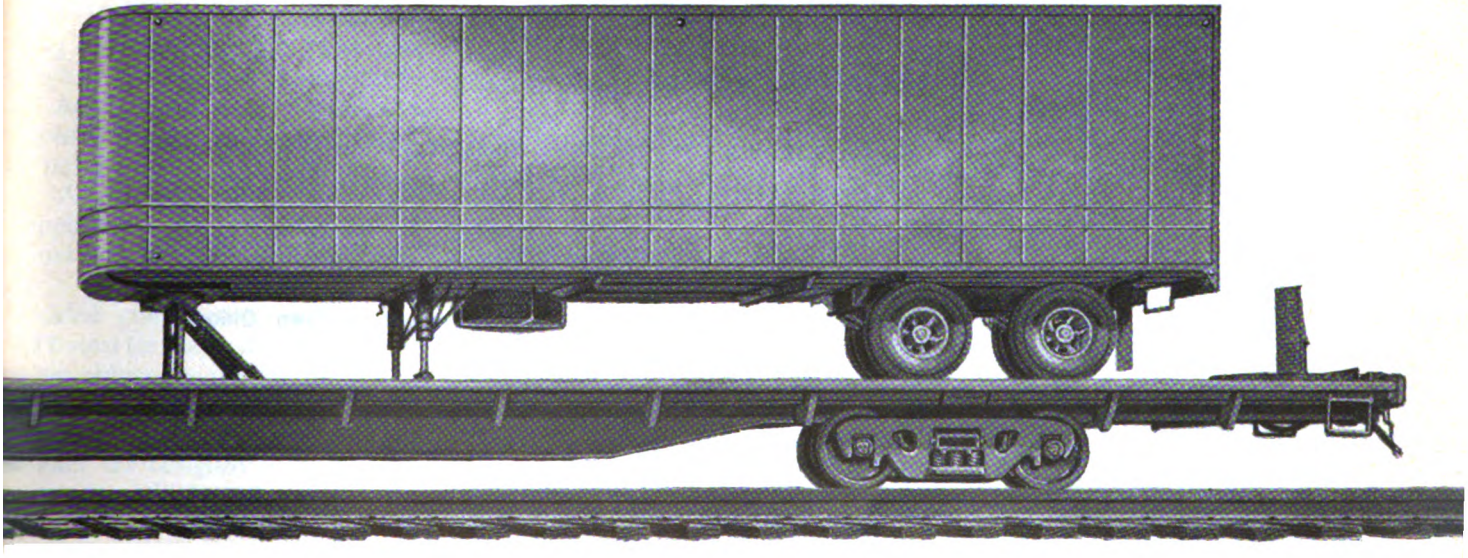
3. The smooth and more effective braking characteristic of COBRA Shoes is particularly desirable for piggyback operations.

4. COBRA Shoes permit greatly simplified and lighter weight brake rigging. Clasp brakes are not required. This means lower maintenance costs and less down time.

COBRA Shoes have now proven themselves in *hundreds of millions of miles of operation.* They definitely improve brake performance; they definitely reduce equipment and operating costs. Your nearest Air Brake Division Representative will be glad to furnish more detailed information concerning the many benefits you can expect from COBRA Shoes.

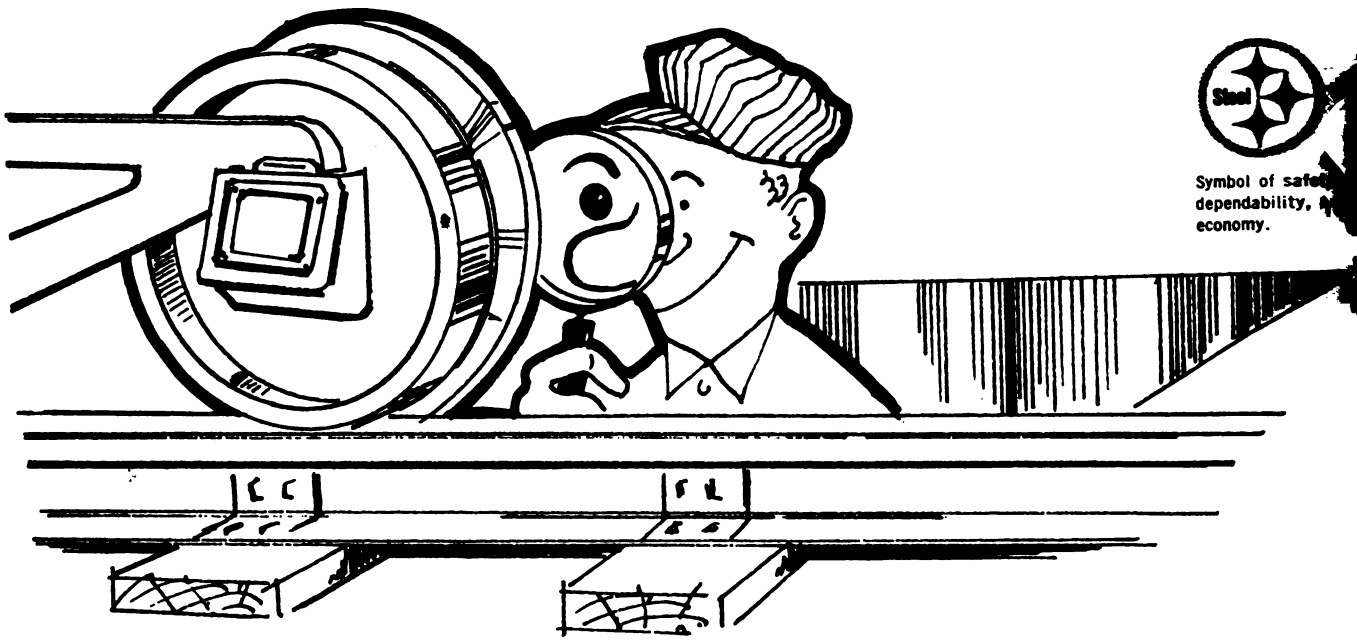
RAILROAD FRICTION PRODUCTS CORPORATION
Wilmerding, Pennsylvania





COMPANY, Specialists in Braking; **JOHNS-MANVILLE CORPORATION,** Specialists in Friction Material.

LOOK UNDER YOUR CARS



Symbol of safe... dependability, ... economy.

Forging and rolling make a big difference in one-wear wheels. But don't just take our word for it. See for yourself. *Look under your cars.* Check the dates on the back of the rims of your wrought steel wheels.

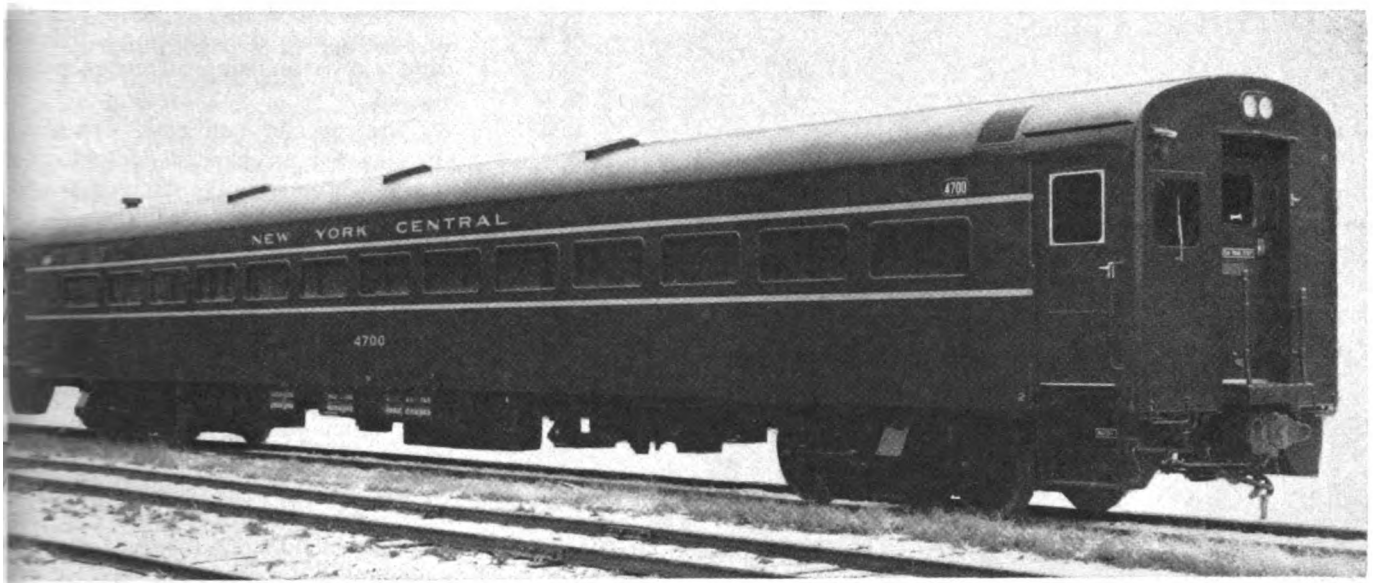
You'll find that many have served longer than 15 years; some for 30 years or more.

Here's more proof

Of the more than 1¼ million Armco One-Wear Wrought Steel Wheels produced since 1932, *only eight* have been reported defective.

So specify dependability and long-term economy. Specify Wrought Steel Wheels forged and rolled by **Armco Division, Armco Steel Corporation, 512 Curtis Street, Middletown, Ohio.**

ARMCO **Armco Division**



ars are going into service on electrified New York City suburban routes where they will replace 93 obsolete cars.

NYC Puts M-U Commuter Cars in Service

Designed for service on electrified suburban routes, cars have latest traction equipment and controls

The New York Central is now putting in service 53 lightweight all-steel commuter cars built by Pullman-Standard. Each of these 130-passenger multiple-unit cars is powered by four 100-hp traction motors, each driving a single-reduction gear unit through an internal-gear flexible coupling. Acceleration is 2.0 mphps and top speed is 75 mph. Dynamic braking of 2 mphps is maintained down to 5 mph. At this speed, dynamic braking is supplemented by the air brake for the final stop as dynamic braking fades out.

Welded construction and use of LAHT steel for major structural members has reduced car weight about 35,000 lb as compared with the road's m-u cars placed in service in 1950. The cars are designed to operate in high-speed multiple-unit service with up to 15 cars in a train and can operate with the 1950 cars.

Powered from the nominal 660-volt third-rail system, the high performance 1240 d-c motors are of the series wound, commutating pole, self ventilated type. They must operate at voltages from 425 to 725 volts, characteristic of direct-current transmission systems. Each axle is motor driven.

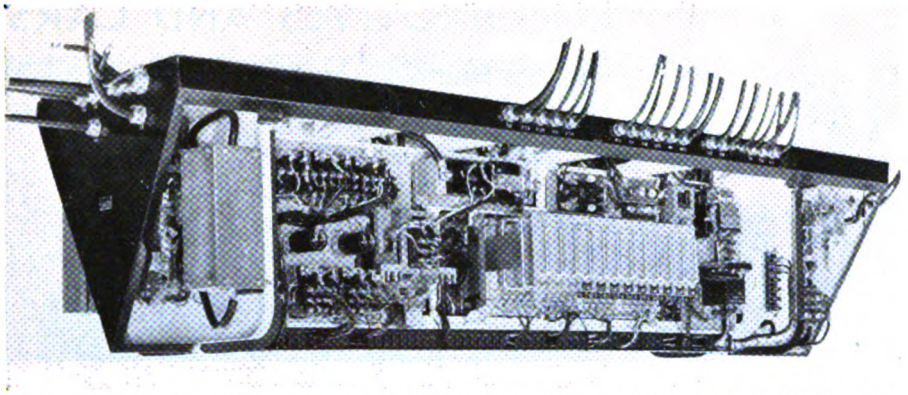
Control Equipment

An important feature of the cars is the use of the SCM (simplified cam magnetic) control equipment. In this package, motor acceleration and dynamic braking are controlled by transistorized quick-disconnect control cards located in the middle compartment of the control housing mounted under the car. Static devices, such as transistors and silicon-controlled rectifiers, are assembled on the cards, each of which represents a particular control function. These cards can be replaced easily and quickly without hand tools or without any knowledge of the circuits involved. Twelve cards control these functions:

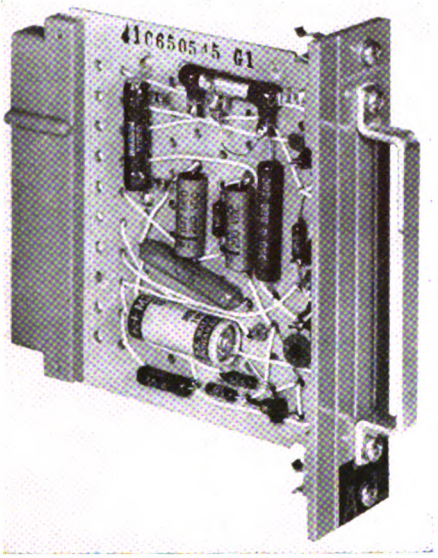
- Progression of the controller to maintain accelerating and braking ratios (four cards);
- Sensing of line potential to cause the control to recycle in case of power interruption (one card);
- Supplying alternating current for other card functions (one oscillator card);
- Regulation of battery-charging voltage (three cards);
- Movement of the cam controller (one card);
- Dynamic brake rate transducer (one card);
- Battery charging reverse current diode (one card).

All control devices operate from a 64-volt d-c supply. The 4-kw motor-generator set, operating from the third rail, furnishes power not only for traction control and battery charging, but for the headlights, markers, emergency lights, and the motor alternator which supplies current for the interior fluorescent lighting.

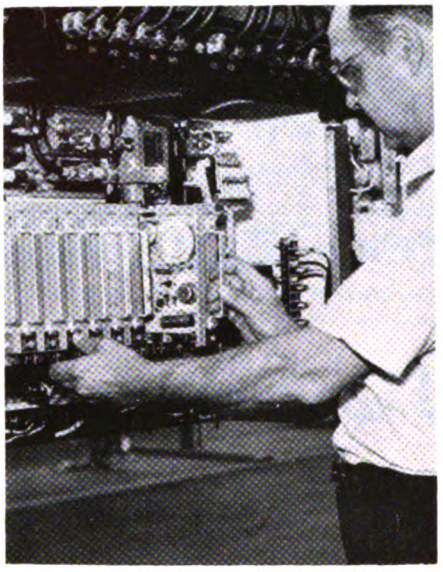
The cars are equipped with a master controller at both ends, having a main



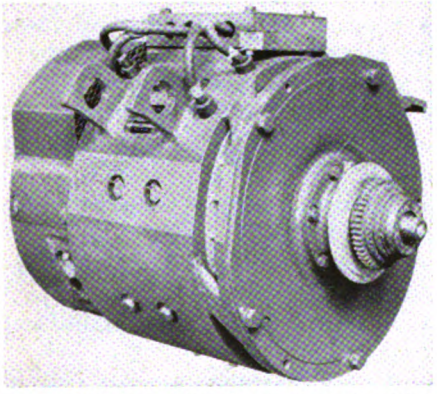
SCM control has transistorized components which replace electro-mechanical relays. Single motor-driven camshaft controller performs most motoring and braking functions.



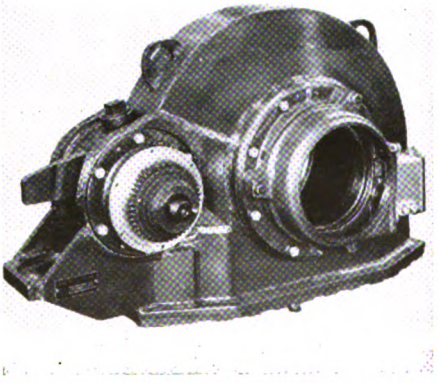
Cards in SCM unit each contain electronic devices for an individual control function.



Control cards can be removed and replaced in the SCM controller without tools.



Epoxy insulation, glass banding, and welded riser-to-lead connections are motor features.



Gear drive units are designed for operation with the high-performance d-c motors.

operating handle and reverser handle. The reverser has three positions—*Forward, Off* and *Reverse*. The four positions of the main operating handle are *Off, Switching, First Running,* and *Second Running*.

With the reverser handle in *Forward* position and the main operating handle in *Switching* position, circuits are established to connect the four traction motors in series, with all external accelerating resistance in the circuit. In *First Running* position, the control is progressed through a series of notches, automatically cutting out the external resistance until full line voltage is applied to the four traction motors. In *Second Running* position, the control is advanced through tra sition to connect two pairs of serie connected traction motors in parall and automatically cut out external r sistance until full line voltage is a plied to each pair of motors with fiel shunted. In the *Off* position, the d namic braking circuits are establish and a low circulating current is mai tained.

The reverser and main operati handles are mechanically interlock to prevent moving the main operati handle with the reverser in the *Off* p sition and prevent movement of t reverser handle with the main oper ing handle in any but the *Off* positio It is necessary to keep the main op ating handle depressed while runnin Interlocking is provided so that t emergency brakes will be applied the handle is allowed to rise exce during a service brake application.

A single brake handle controls a tomatic blending of the dynamic a air brake systems. Air brakes a combined automatic and electro-pne matic, straight air Schedule 2 CMUE, using the 26-C control val with dynamic interlock. An M-4 automatic brake valve is at each co trol station in the ends of the car.

The four-wheel electric mot trucks have cast nickel carbon ste frames, bolsters and spring plank They are equipped with 5½ x 10-i roller bearings, 36-in, multiple-we wrought-steel wheels, single equa izers, inside swing hangers, and a coil-spring suspension. Each truc has package brake units with compos tion shoes, self-lubricated large cent bearing, longitudinal bolster anch rods, and a pair of rotary hydrau shock absorbers. Truck wheel base 8 ft 3 in.

Cor-Ten steel is used throughou the carbody, including end framin welded girder-type side framing, an center and side sills. Vestibule pos are T-1 alloy steel. The turtle-bac AAR-contour roof with blunt ends e tends the full length of car and ov the vestibules.

Inside surfaces of side and en frames are covered with ⅛-in. c a standard sound deadening coatin Under sides of roof sheets receive coat of primer and a ¼-in. coat c insulation. Side and end walls are in sulated with 2½ in. of mineral bas insulation. Insulation under floor an roof is 3 in. thick. False floor sheet below the insulation are stainless steel

No paint is used on car interiors. etween the framing members and in- rior finish panels ⅛-in. composition ›ard is applied. Ceiling and wainscot ınels and the one-piece window ames are solid plastic. Frieze panels, er panels, and panels on the low iling under the plenum chamber are nyl-covered aluminum. End panels e vinyl-covered steel. The wainscot ıd pier panels are fastened in place ith screws. Frieze panels are re- ssed in a rubber mounting, making rews unnecessary. Heat panels on wer side walls are stainless steel. The ır color scheme: bone-white ceiling, vo shades of blue on side walls, bur- ındy red on the end panels, and blue nyl rubber on the floor.

Window sash is the double-glazed, reather-type, with ¼-in. plate glass n the outside and ¼-in. safety and raduated tinted glass on the inside iminating need for shades. End win- ows, provided only on the operator's de in each vestibule, are laminated ıfety glass with an inner layer of elec- ical-conducting material for electric efrosting of the entire pane. Body eats are three and two "throwover" ype, with cushions and backs covered ith natural rattan.

Exterior paint is Pacemaker green, ith imitation gold striping, lettering, nd numbers. The roof receives one oat of primer and two coats of ce- ıent. The entire underframe is fin- shed with one coat of primer and a nish coat of cement. Trucks, except heels, and all apparatus under floor, re given one coat of black enamel.

The electro-mechanical air-condi- oning system is rated at 9 tons. Com- ressor and condenser units, driven by -c motors, are mounted below the ar floor. The evaporator, blower, and ecirculated air grille are above the owered ceiling adjacent to the body nd door. Outside air enters through eather-protected grilles on each side f the car in the roof. Air distribution s through a continuous ceiling duct nd diffusers on each side of the cen- ral lighting fixture. There are six 8- 8-in. exhaust grilles and registers in he ceiling, each connected with an xhaust ventilator on the car roof.

Strip-type electric resistance heaters urnish floor heat in the carbody, toilet nd at the operator's stations on both estibules. The evaporator, equipped ith a 2,800 cfm centrifugal blower an, has 17 kw of fin-type strip re- istance heaters. This heater bank is divided into two separate 8½-kw sections, making possible two-stage control of overhead heat. Floor heating units, consisting of 48 radiator assemblies of 480 watts each, 110-volt, are installed in a continuous baseboard duct with heating elements between the seats. The total floor heating capacity is 23 kw.

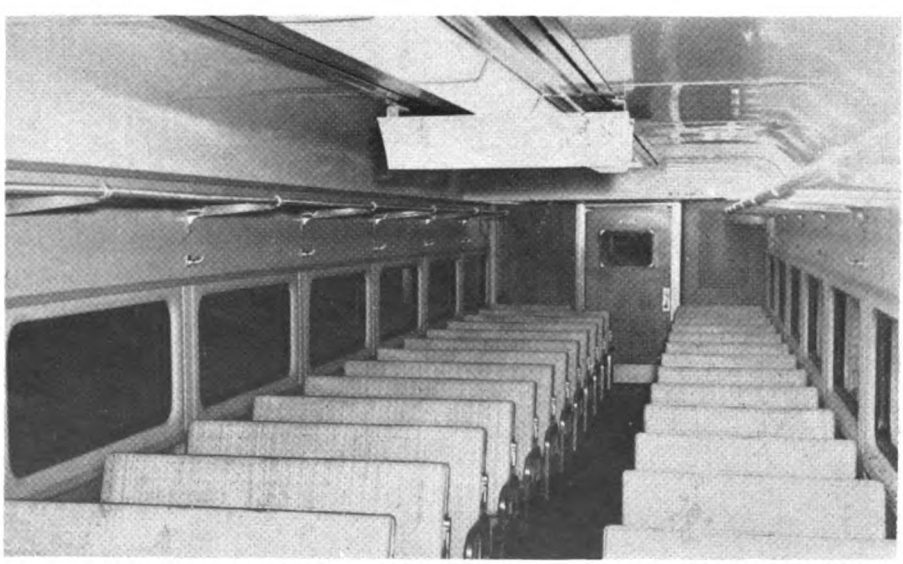
One transistorized temperature control panel with a three-position selector switch controls heating and cooling. The blower fan switch is also part of the panel. One 74-deg F thermostat controls cooling. One-half of the overhead heat is controlled by one 70-deg F thermostat. Floor heat and the remainder of the overhead heat is controlled by a 68-deg F thermostat. Floor and overhead heat is available only when the blower fan is in operation.

Illumination is supplied by 40-watt, 48-in. fluorescent lamps in a continuous row of 8-ft ceiling fixtures on the car's center line. Exposed metal surfaces of the fixtures are satin-finished aluminum. Diffusers are translucent acrylic plastic. The 6-watt, 60-volt emergency incandescent lamps are also located in the 8-ft fixtures. A 2-kw alternator, operating on 64-volt d-c supply, furnishes 115-volt, 60-cycle, a-c power for fluorescent lighting, defrosters, water cooler, and heater fan motors. The car has a 64-volt lead-acid battery.

The light weight of the car is 115,-000 lb. Length over coupler pulling faces is 85 ft and between truck centers 59 ft 6 in.; width over side sheathing, 10 ft 4 in., and height to top of roof carline, 13 ft. Interior aisle width is 22 in.

Partial List of Suppliers

Trucks	Adirondack Steel Casting
Truck springs	Alco Products
Wheel and axle assembly	United States Steel
Couplers and yokes	American Steel Foundries
Draft gear	Waugh Equipment
Equalizers	Canton Drop Forging & Mfg.
Shock absorbers	Houdaille Industries
Journal bearings	Timken Roller Bearing
Bolster locking center pin	W. H. Miner
Air brakes	New York Air Brake
Hand brake	Ellcon-National
Brake shoes	Railroad Friction Products
Air conditioning equipment	Safety Electrical Equipment
Filters—air conditioning	Farr
Heating equipment	Vapor
Batteries	Electric Storage Battery
Electric controls; wire and cable	General Electric
Jumpers, receptacles, headlights	Pyle-National
Tail lights	Lovell-Dressel
Light fixtures	Trans-Lite
Insulation	Gustin-Bacon Mfg.
Insulation sound deadener	J. W. Mortell Minnesota Mining & Mfg.
Vinyl rubber floor	Rubber Corp. of America
Step treads	Globe Products
Windows, luggage racks	Adams & Westlake
Coach and cab seats, seat covering	Coach & Car Equipment
Window trim and wainscot panels	Anawan Plastics
Glass	Libbey-Owens-Ford
Door operators	Vapor
Water cooler	Ajax Consolidated
Lavatories	Duner
Exterior paint	du Pont
Lettering and numbers	Demp-Nock



Seating capacity of car is 130. Seats are spaced on 32-in. centers. Lighting fixtures down center of car are hinged to permit cleaning of air-conditioning duct.

IC Centralizes Sand Drying

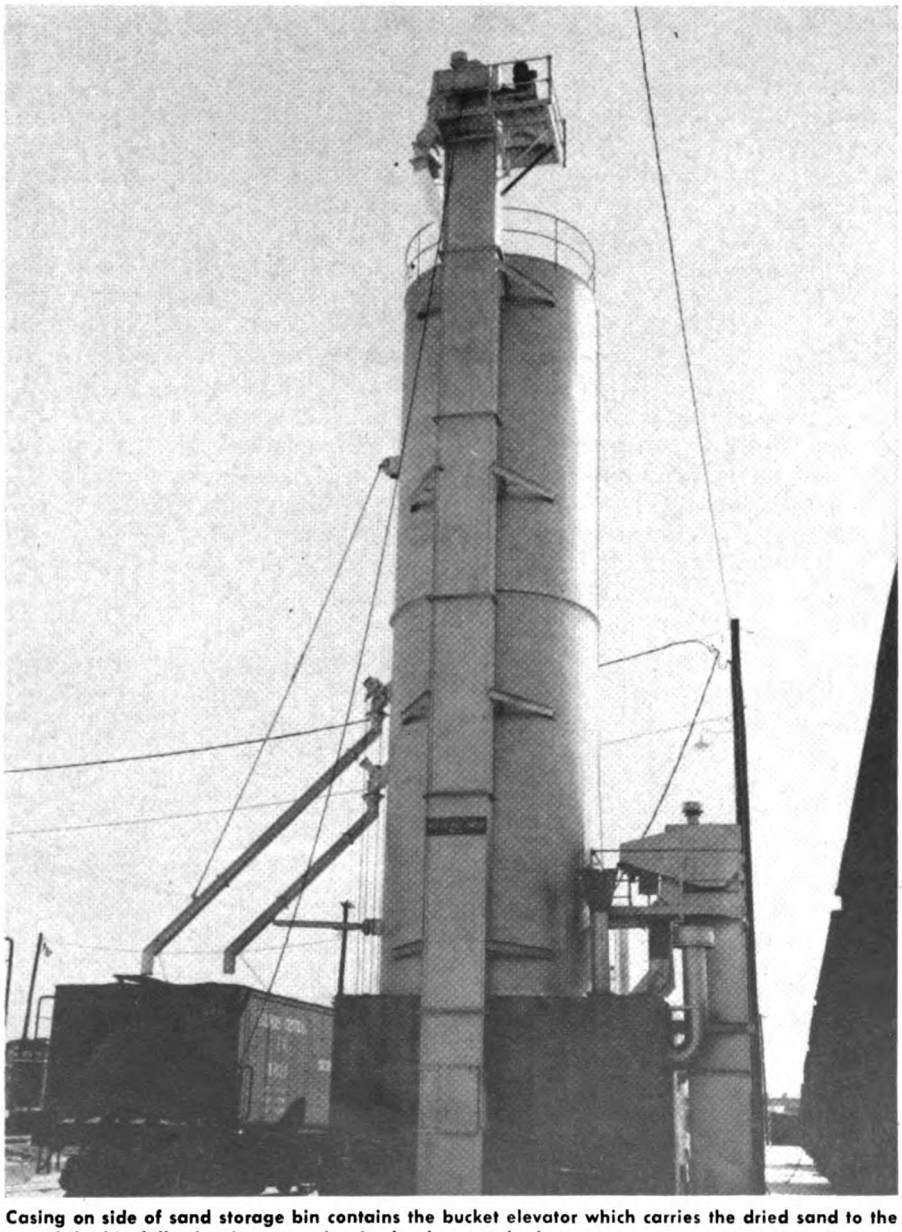
Preparation and distribution for southern part of system are now handled from a new facility

A mechanized sand-drying plant at North Jackson, Miss., prepares sand for all Illinois Central diesel servicing facilities south of the Ohio river. The plant, operated by one man, went into operation in October 1961. It has a capacity of 4 tons of dry sand per hour and a storage capacity of 185 tons. "The unit operates efficiently with a reasonable amount of attention," R. J. Chinn, IC mechanical and shop engineer, reports. "We are getting better sand control and a much better quality of sand."

Wet high-silica sand with a minimum of rocks and debris is purchased at Fluker, La., about 108 miles from Jackson. Incoming twin-hopper cars loaded with this sand are spotted on the unloading track adjacent to the sand-drying plant. Sand is discharged into an underground receiving hopper having a capacity of 26 tons. An adjustable metering gate at the 24-in. square opening in the bottom of the hopper controls flow to a horizontal flat belt conveyor which carries the sand to the boot end of a vertical-bucket elevator. The floor in this area drains toward a ½-hp sump pump to assure removal of water.

Wet sand from the bucket elevator is discharged into the receiving hoppers of two rotary, gas-fired dryers through a two-branch chute. The dryers are installed at ground level in the sand house. Screens above the dryers separate the debris and oversize particles which are diverted into discharge chutes.

From the dryers, dry sand drops into a 40-cu ft collecting hopper and is carried by a centrifugal-discharge bucket elevator to the top of the 185-ton storage bin. The bin is designed so that 130 tons can be loaded into cars for distribution to line points, leaving 55 tons for consumption at the Jackson locomotive terminal. The swivel-mounted discharge spouts for loading sand into cars can service two roof hatches with one spotting of the car.

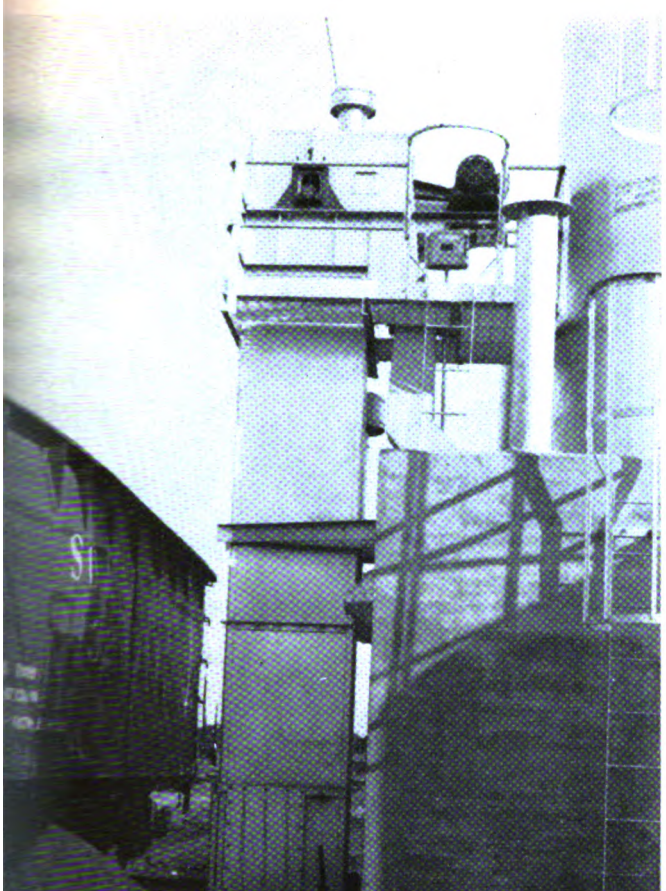


Casing on side of sand storage bin contains the bucket elevator which carries the dried sand to the top of the bin following its processing in the dryer at the bottom.

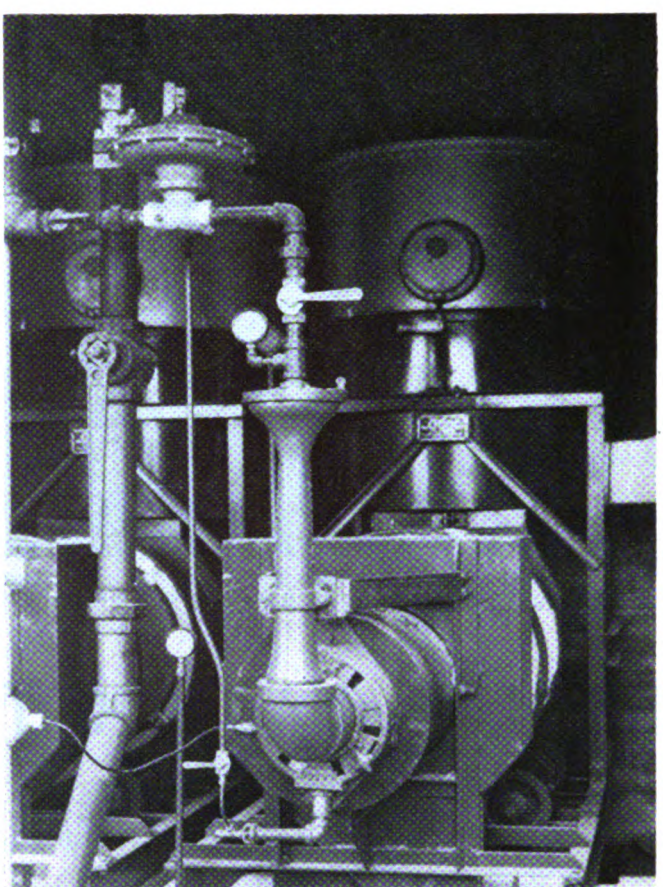
Operations Automatic

Unloading and drying in the plant are fully automatic. After the main switch is thrown, the pressure-actuated switch in the bottom of the concrete receiving hopper operates the wet-sand conveyor and bucket elevator only when sand is in the hopper. Pressure switches in the receiving hoppers of each dryer control the wet-sand conveying machinery to prevent flooding of the elevator casing while assuring a constant flow to the dryers. These switches de-energize the elevator and feeder circuits when both dryer hoppers are full and start the machinery when either hopper needs filling.

A high- and low-level switch in the collecting hopper on the dryers energizes and controls the dryers and the automatic bucket elevator to the storage bin. When the sand level is over the high switch, the circuit to the bucket is energized and both dryer circuits are de-energized. As soon as the sand



Wet sand is delivered into receiving hopper as it comes from the hoppers of open-top cars which bring it from Louisiana. Elevator transfers sand to the receiving hoppers over the dryers.



Dryers take their sand from the pair of hoppers overhead. After drying, the material falls into collecting hopper for movement to the large storage bin. Each dryer processes 6 tons per hr.

evel falls enough to clear the high-evel switch, circuits to the dryers will gain be energized, provided the wet and receiving hoppers are full. The ucket elevator will continue to oper-te until the sand level in the collect-ng hopper falls below the low-level witch. When this occurs, the bucket levator stops. A time relay permits urther operation of the buckets until he cycle is completed and the buckets re cleared of sand. In addition, the upply of gas to the dryers is shut off y an automatic switch in case of lame-out. Safety controls are pro-ided throughout the system.

A high-level switch in the 185-ton torage bin is positioned so that when he sand reaches full level the circuit o the automatic bucket elevators is in-errupted. This prevents further eleva-ion of sand until the overhead bin can ccommodate more and prevents looding the casing. A low-level witch energizes a signal light to warn hat the available supply of dry sand s low.

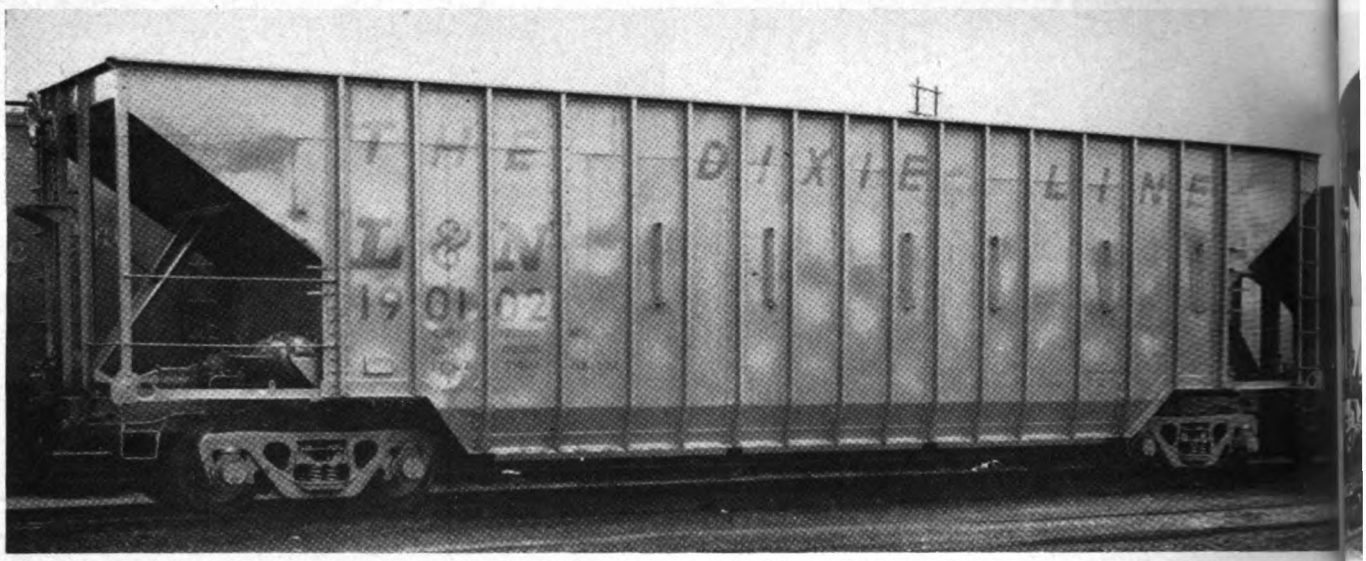
Later this year, a 20-cu ft sand-elevating drum will be installed under the dryers to supply sand for two elevated sand towers at the nearby diesel servicing tracks. The dry sand will be blown through 2½-in. pipes to the sand towers.

Sand Cars

Two types of cars are used to haul the dry sand from the plant. The IC has 43 sand cars, 12 on the southern lines. Over seven years ago, these 67½-ton, 1,357-cu ft cars, equipped with eight loading hatches and two discharge outlets, were converted from steam locomotive tenders. At that time dried sand was purchased. Today, the cars on the southern lines are shuttled between North Jackson and diesel-servicing facilities at points such as Baton Rouge, La., Vicksburg, Miss., and Louisville and Central City, Ky. These terminals have fixed diesel-fuel storage facilities. At each point there is a heavy demand for dry sand because of the large number of locomotives serviced. At all these terminals sand is unloaded from the cars by gravity into an underground storage tank between the rails and is blown to the sand-storage towers at the sanding stations.

Seven combination diesel fuel oil and sand cars are used for distribution to servicing points where limited quantities of oil and sand are required. These cars, also converted tenders, have a capacity of 10,000 gal fuel oil and 130 cu ft sand. Oil is obtained from a 500,000-gal storage tank at the North Jackson diesel shop. The oil and sand cars are parked at Clarksdale, Cleveland, Greenwood, and Silver City, Miss., where fixed facilities are not needed. Resupply and return of empties to the central distribution plant is automatic for all of the locomotive servicing cars.

The North Jackson facility operates one-shift, five days a week. An occasional second-shift man is used part time, depending on supply needs. The sand-drying system was designed by Ross & White and developed jointly with the IC.



Hopper designed by L&N is higher than either Pullman-Standard or Ortner designs. The 12 longitudinal doors are operated by an electric motor to give quick unloading of frozen ladings. It was completed at road's South Louisville shop in February and has just gone into test service.

L&N Testing 100-Ton Hopper Cars

Three prototype 100-ton coal hopper cars, equipped for automatic unloading, are now being road tested by the Louisville & Nashville. They are said to be the first of their kind to be used by any railroad. The need for a high capacity car that could operate on a fast turn-around basis prompted the design and development of these 100-ton hoppers. According to the L&N, it is an economic necessity that the time consumed by ordinary unloading procedures be greatly reduced. To do this, a car must discharge its contents quickly without complicated and individually operated hopper door mechanisms, or the use of a car shaker. Frozen ladings should also be discharged with reasonable speed.

The cars have been designed also to help the railroad provide larger carload capacities, making possible savings for shippers. The 100-ton automatic unloading hopper may well be the answer. However, the L&N has been so impressed with tests of its present cars that it is now investigating the possibility of a 200-ton hopper similarly equipped.

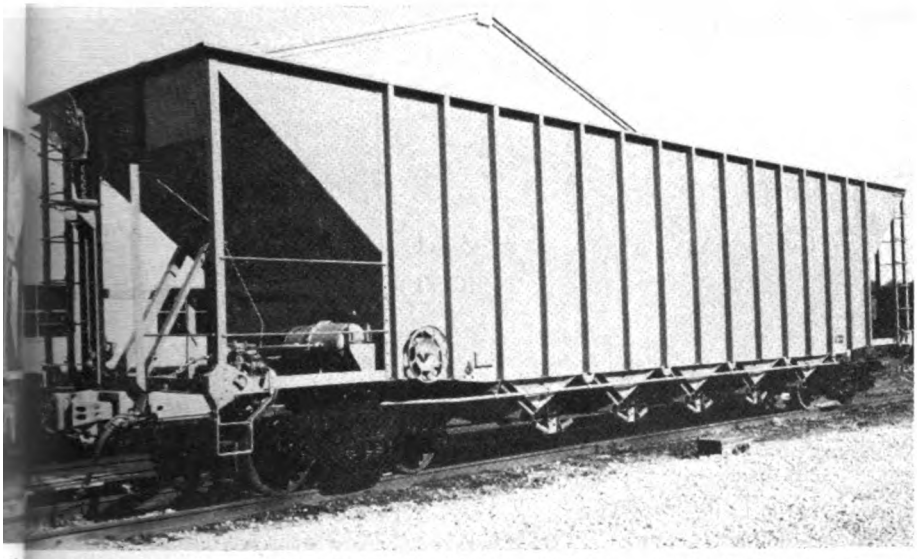
One of the cars with specially designed quick-unloading devices, designed and built by the L&N mechanical department, can be unloaded in 10 to 15 sec. Two other cars were designed and built, one by Ortner and the second by Pullman-Standard. All three are to be equipped with electric motors for opening and closing the hopper doors. Ortner is using a door mechanism designed jointly with the L&N. The Pullman-Standard car has Enterprise doors. These two cars have stainless-steel slope sheets. The L&N car is to be similarly equipped later.

The Ortner car has been tested in the field under all weather conditions for over six months, hauling capacity coal loads in the vicinity of Corbin, Ky. Testing of the other two cars, only recently completed, has just started.

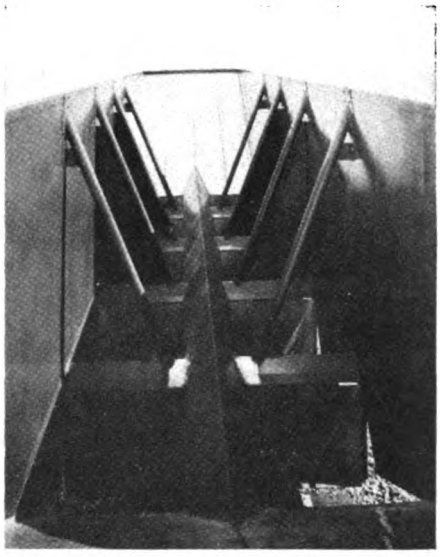
Unloading of the Ortner car takes



Pullman-Standard design has eight longitudinal hopper doors which are controlled by a single shaft that runs the length of the car. This was only one of the three new designs which has been equipped with 36-in. wheels. Testing has recently started in L&N coal territory.



Car built by Ortner has undergone six months of testing. Coil springs cushion the transverse hopper doors when they are dropped open rapidly, primarily to free frozen ladings.



Interior or Ortner car shows openings available through bottom of cars with doors released.

23 sec. The ten pairs of transverse double hopper doors are now powered by an air motor. Over 80% of the load is directly above the door openings. The automatic quick-discharge door mechanism consists of a series of operating rods and levers that sequence the opening of the doors, allowing each pair to drop quickly upon release to loosen frozen loads. This eliminates the need for a car shaker. Ortner officers say the success of this door arrangement is based on the rapid opening, the stainless-steel floor sheets and the large area through which the lading can pass. The car has approximately 157 sq ft in a horizontal plane through which the coal can be dropped as compared to about 19 sq ft for the conventional 70-ton hopper car.

Power for opening and closing the twelve longitudinal hopper doors on the L&N-built car is supplied by a 7½-hp motor mounted on the car underframe. It is operated at present by plugging into an electrical outlet. A specially designed electrical contact shoe is also being tested. It will be located so that the car can be moved to the dumping area, doors opened, contents emptied, and doors closed, all automatically, and then moved on without having to make a stop. The longitudinal doors practically eliminate the spilling of coal on the rails. The doors can be manually operated in the absence of electrical power.

Longitudinal Doors

The Enterprise doors on the Pullman-Standard car are similar to those used on the 90-ton coal hoppers built by the Santa Fe at its Topeka shop last year (RL&C, Oct. 1961, p 28). Of the eight longitudinal doors, four are hinged at the center sill and four at the side sill. All are controlled from one common shaft and are operated from one location on the car. A roller-bearing worm-and-gear arrangement on the shaft actuates driving sprockets connected by laminated-block chains to driven sprockets for positive control of door opening and closing. The doors can be held in any position from partial to full opening and are equipped with a double locking fixture when closed. Either air or electric motors could be utilized for automatic operation. The doors are designed to open in 10 sec and close in 15 sec. In closed position, they are at a 27-deg angle from the horizontal and slightly beyond 90 deg in open position.

All the cars are of outside-side-stake design with 3/16-in. side sheets. All have 6½ x 12-in. roller bearings, Hyatt on the L&N-built and Ortner cars and Timken on the Pullman-Standard car. The Ortner and L&N cars have 33-in. wheels; the P-S car, 36-in. wheels. All three are fitted with Cobra composition brake shoes and SAB slack adjusters.

L&N mechanical officers say that these car designs maintain a favorable ratio between lading and gross weight despite the 100-tons capacity. The ratios are similar to those of the 50- and 70-ton hoppers now operated by the road. The cars also meet L&N clearance limits. All of the developments, the L&N states, will be covered by patent applications where necessary.

Principal Dimensions

	L&N built	Pullman-Standard	Ortner
Length over coupler pulling faces, ft-in.	52–11	53–0	52–11
Length over strikers, ft-in.	50– 5	50–6	50– 5
Length over end sills, ft-in.	49– 5	49–6 3/8	49– 4 1/2
Inside length, ft-in.	49– 4	49–6	49– 4
Inside width, ft-in	9– 7 3/4	9–7 3/4	9– 8
Overall width, ft-in.	10– 5 3/4	10–6 1/8	10– 5 3/4
Overall height, ft-in.	13– 0	12–0	12– 9
Length of door openings, ft-in.	24– 8 3/8	22–0	26– 2
Number of pockets in car	3	2	3
Angle of end slope sheets, deg.	35	30	39
Capacity with 10-in. avg. heap, cu ft	4,181	14,233	3,851
Capacity, lb	192,000	198,000	200,000
Light weight, lb	71,400	65,100	61,800

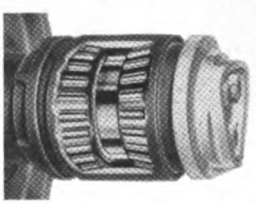


MODERN FREIGHT



AR

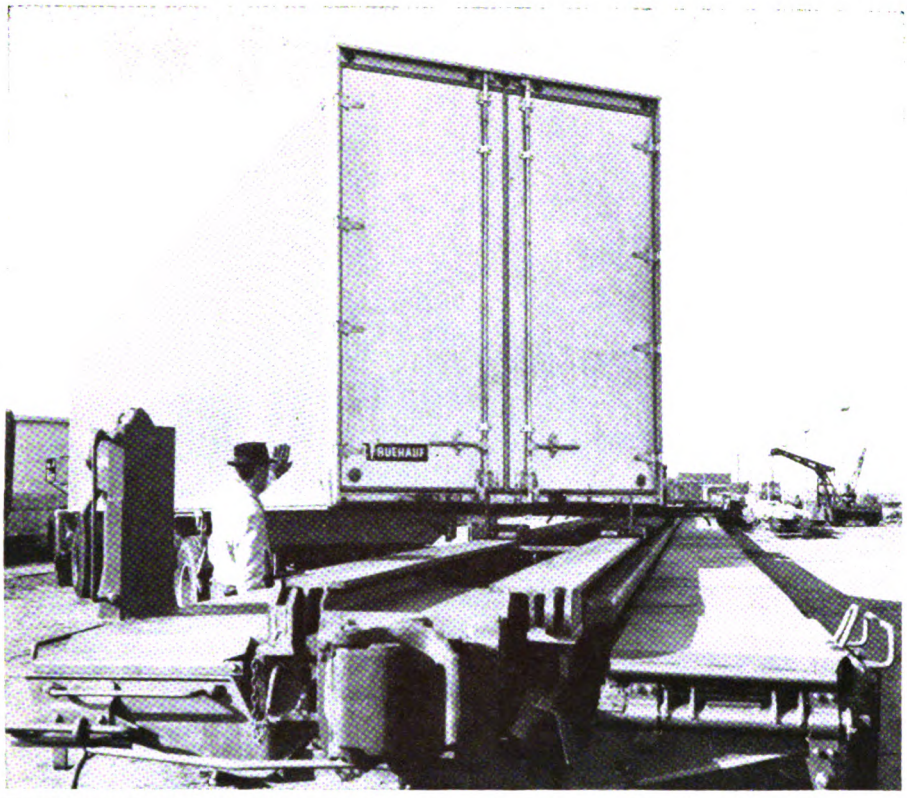
You don't have to look any higher to see whether a freight car can produce revenue in proportion to the investment it represents. Unless it's on roller bearings, it stands a good chance of having a hot box and holding up not only its own lading but the entire train. ■ The railroads are putting more and more of their freight cars on roller bearings. Three out of four new cars in 1961 went on roller bearings, to make them modern from the track up. And old cars are being converted to "Roller Freight" to up the revenue they can produce. ■ Many of the "Roller Freight" cars you see are Timken® tapered roller bearing-equipped. That's the railroad bearing backed by the most experience, the most service, and the most acceptance. Timken bearing-equipped cars average over 100,000,000 miles between setouts due to overheated bearings, virtually eliminating the No. 1 cause of freight train delays. And they make possible trouble-free operation of new, high speed freight trains. ■ If your cars aren't producing enough revenue and profit, boost their efficiency by putting Timken bearings on their axles. The Timken Roller Bearing Company, Canton 6, Ohio. Makers of Tapered Roller Bearings, Fine Alloy Steel and Rock Bits.



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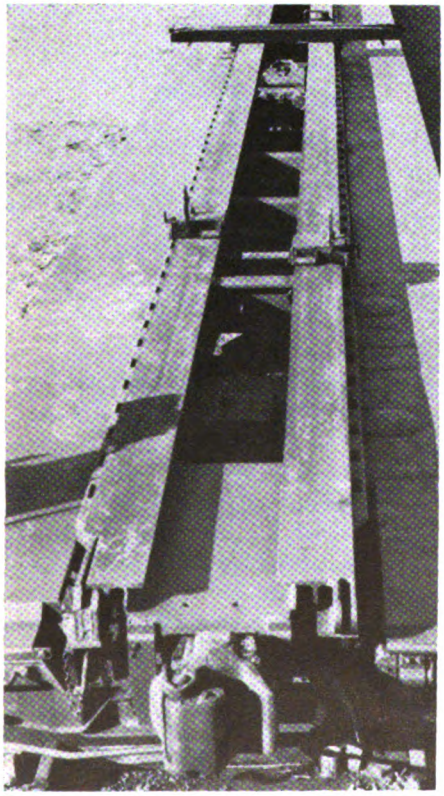
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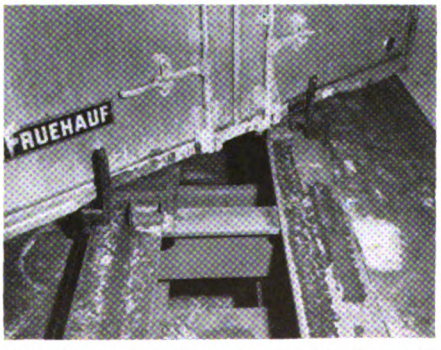


Container can be loaded or unloaded from either side of the car. Transfer takes 3 min.

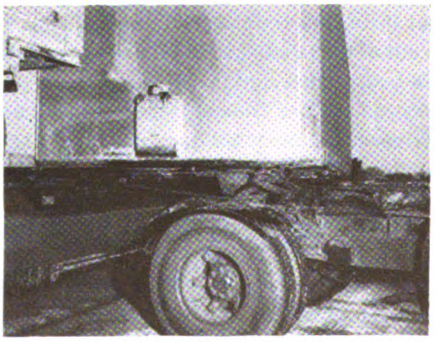
Containers Load From Side on New G-85



Kingpin bolster (top), master roller assembly, and roller fins are used in side loading.



Master roller assembly moves on top of center-sill beams. Behind roller fins are self-locking pins that engage master holes in container which can then be rotated into loaded position.



Cable, hooked to container, passes around pulley on kingpin bolster to tractor winch.

A piggy-back car, said to be the first to combine all present-day trailer and container loading mehods, has been designed and tested by General American. The "G-85 with cushioned rub-rails" can handle both trailers and containers interchangeably. Containers can be loaded by tractor, crane, fork-lift, or straddle carrier.

Developed "to eliminate the need for over-specialized equipment," according to Spencer D. Moseley, General American president, the new design is a modification of the G-85 introduced by GATC in 1959 (RL&C. Oct. 1959, p 27). It is 85 ft between end sills, equipped with roller-bearing trucks, and weighs 67,000 lb.

The rub-rails are attached to both sides of the center sill with shock-absorbing rubber pads. To accommodate containers of any length, tie-down pockets in rubber mountings, spaced at 12-in. intervals in the rub-rails, allow anchored loads to move 8 in. in either direction. Because the G-85 hitch for TOFC service fully retracts into the center sill, there is no interference with container handling. All tie-down equipment can be stored within the center sill when not in use.

In side loading, a container mounted on a demountable air spring bogie is backed on the car at an angle of 30 to 45 deg by an ordinary truck tractor. The tractor is equipped with a hydraulic fifth wheel on leveling cams and a regular winch driven by a power take-off. The end sill of the container contacts fins on free-running master rollers and causes them to roll on the center sill, positioning the roller pins beneath master holes in container end.

The driver raises the tractor fifth wheel, causing the roller pins to engage the master holes. Bogie is relieved of container weight, detached from container, and air spring suspension deflated. The driver then jack-knifes tractor toward kingpin bolster as master rollers carrying container roll toward end of car. The front corner of container nearest car is positioned on near corner of the slotted kingpin bolster when tractor fifth wheel is lowered. Kingpin bolster rests on center sill and is tied into cushioned rub-rails. The fifth wheel is disengaged from the kingpin, and winch cable is applied. The winch then pulls the front end of container onto the bolster until the kingpin is automatically locked, securing container in center of kingpin bolster. Transfer takes 3 min.



622—W

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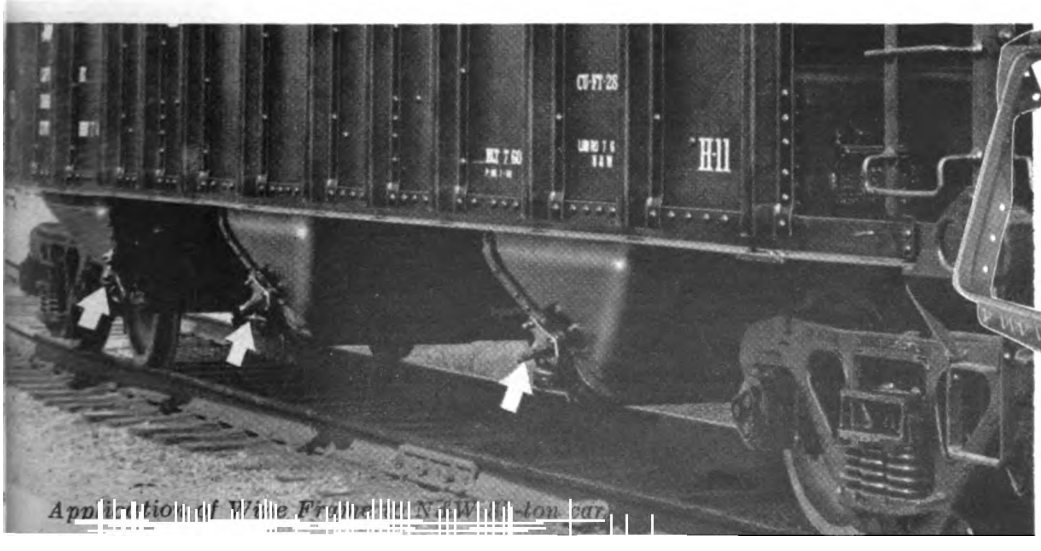
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Auto-rack car is impacted against stationary gondola. Data is recorded in nearby van.

Measuring Impacts on Auto-Rack Cars

By Joseph L. Jacobs

Rail transportation is rapidly assuming a major role in the delivery of new automobiles shipped on piggyback cars. Two-deck or three-deck racks make it possible to handle up to twelve standard or fifteen compact automobiles on a single car. As a rule, rail-freight is used by shippers of automobiles for distances exceeding 400 miles.

Engineers of the Dana Corp., in their efforts to improve rack structures, take into account a daily fact of life shared by all railroad rolling stock —impact. To examine impact and its distribution through the flat car, rack, cargo, and tiedowns, they have developed a mobile instrumentation system for recording strains, "G" forces, displacement, and impact as cars are impacted at various speeds. A Brush six-channel recorder and a variety of specialized Brush amplifiers constitute the primary means of recording results. The recording system is mounted in a truck or station wagon and driven to the scene of the tests.

The Dana rack, an assembly capable of withstanding severe shock, is cushioned on the car to absorb and distribute impact energy with minimum effect on the structure and cargo. The superstructure is mounted on 18 4-in.-high Lord synthetic rubber shear pads that absorb vertical vibration in compression and cushion longitudinal impacts in shear. Energy absorption of these units exceeds 60,000 ft-lb during a 10-mph impact and forces on the load are reduced to as low as 2.5 G's from over 10 G's on the car. The entire system is designed to produce excellent damping and to avoid resonant responses in all three planes under any foreseeable condition.

A recent series of tests, typical of many conducted, was designed to compare the impact absorption effectiveness of two underframe cushioning systems, one having an 8-in. and the other a 20-in. travel. With the Brush recording truck standing by, a fully loaded auto-rack car was instrumented with a number of force-measuring transducers and then impacted successively at speeds of 5, 6, 8 and 10 mph against several gondolas loaded with scrap. To indicate the magnitude of forces involved, one impact at 10 mph was recorded at over 900,000 lb on the striking car.

Seven different types of measurements were sought: deceleration of the carbody; longitudinal and vertical acceleration of the rack at key points; acceleration of the automobiles; relative displacement of the rack with respect to the car; strains on tiedowns and structural members of the rack; speed of the car at impact, and the exact instant of impact.

Transducers on the test car included LVDT (linear variable differential transformer) accelerometers clamped at several points—to the side rail of the car, to the cushioned frame in position to give both vertical and longitudinal readings, and to one of the automobiles in the load. To measure displacement of the rack, a linear potentiometer clamped to the flat-car side rail was linked with the movable structure by a pushrod attached to the potentiometer slide wire. Strain-gage load cells picked up the forces involved at the cargo hold-down cables, and additional strain gages were cemented to various structural members of the car.

To measure speed at the moment of impact, a self-generating electromagnetic pickup was secured to the forward truck, and a length of 2 x 4 with steel plates imbedded at 4-in. intervals was spiked to the ties. As the pickup passes each steel plate, sufficient voltage is generated to produce pips on the recorder trace. Speed is calculated by counting pips per unit of time. Finally, a point of impact switch was mounted on the coupler knuckle to register the instant of impact on an event-marker channel of the recorder. A shielded cable, 150 ft long, connected all leads to the recording truck where the various signal sources were balanced and conditioned by means of controls on the Brush amplifiers.

The pickup devices fall into five distinct classifications, three of which require external a-c excitation, and all subject to the resistance and capacitance inequities inherent in the long lead cable. As such, they illustrate the

Mr. Jacobs is instrumentation and test engineer, Experimental Dept., Dana Corp., Toledo, Ohio.

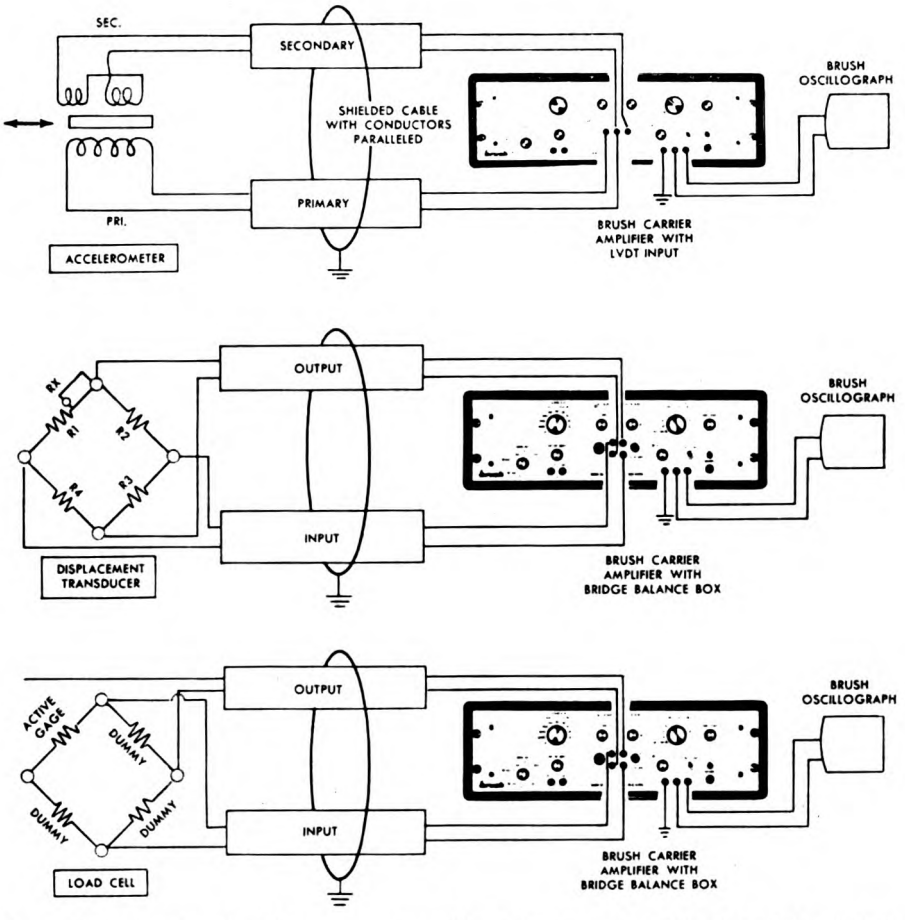
daptability of modern signal-conditioning equipment used with direct riting recorders.

One illustration is the accelerometer, a linear variable-differential ransformer, which is the signal-generating element. In this device a fluid amped ferrite core is displaced by acceleration and moves within an a-c xcited arrangement of coils. The ovement alters the transformer oupling effect. In turn the output oltage is altered by an amount proortional to the degree of displacement. The voltage change is then a near expression of G force.

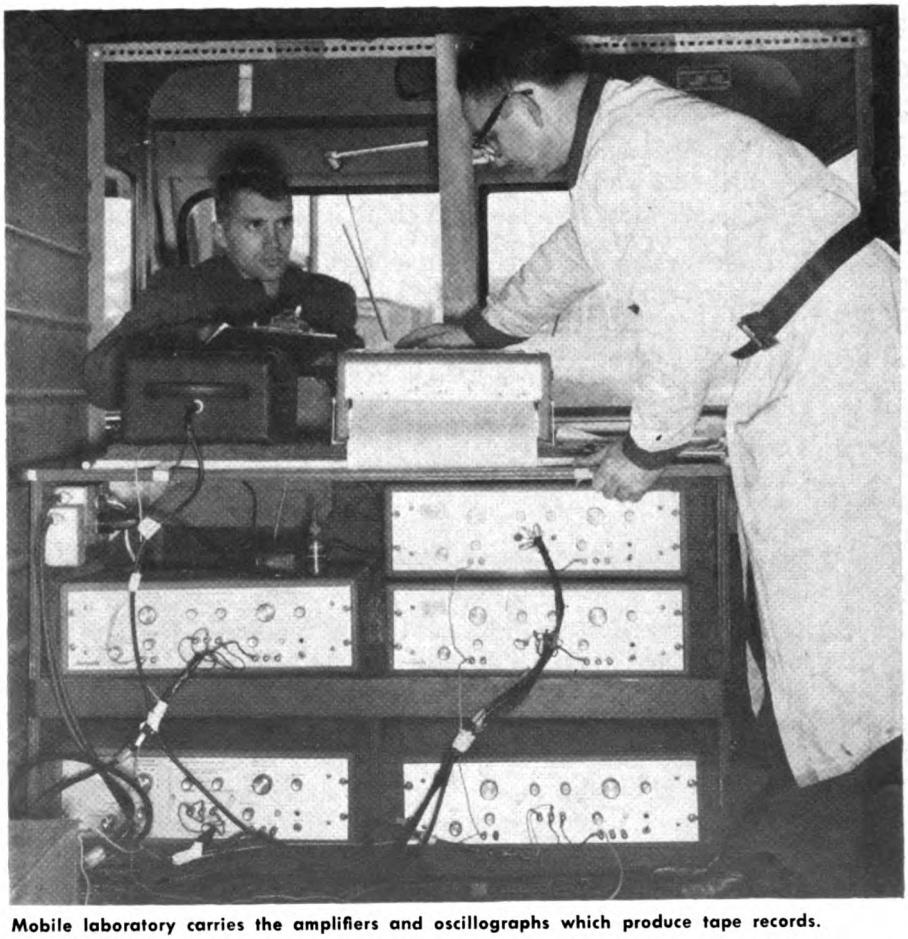
With the Brush carrier amplifier, a odel RD5612 00, a closed-loop system is provided which delivers regulated a-c excitation voltage to the ransformer primary winding, receives he voltage differential signal, demodulates this to a d-c envelope, and amplifies it to the magnitude required by he oscillograph penmotor. Phase hift between input and output is adusted by means of a phase-adjust conrol with which the amplifier is fitted.

A similar system, using a Brush amplifier and a resistive input bridge balance section, is used for recording train signals from load cells and strain gages. Here the change in resistance o an a-c excitation voltage is produced by attenuation of strain gages by strain and is recorded in terms of microinch-per-inch strain or pounds. The Brush carrier amplifier supplies he regulated a-c excitation to the gages, demodulates the output, and amplifiies the resulting d-c signal to a evel suitable for recording. With the gages disposed in a Wheatstone bridge, the bridge arms may be brought into balance by means of resistive and capacitive balance controls on the amplifier panel. Further resistance and capacitance errors caused by the 150-ft cable lead are similarly balanced out, so that recorder pen excursion is a true recording of strain.

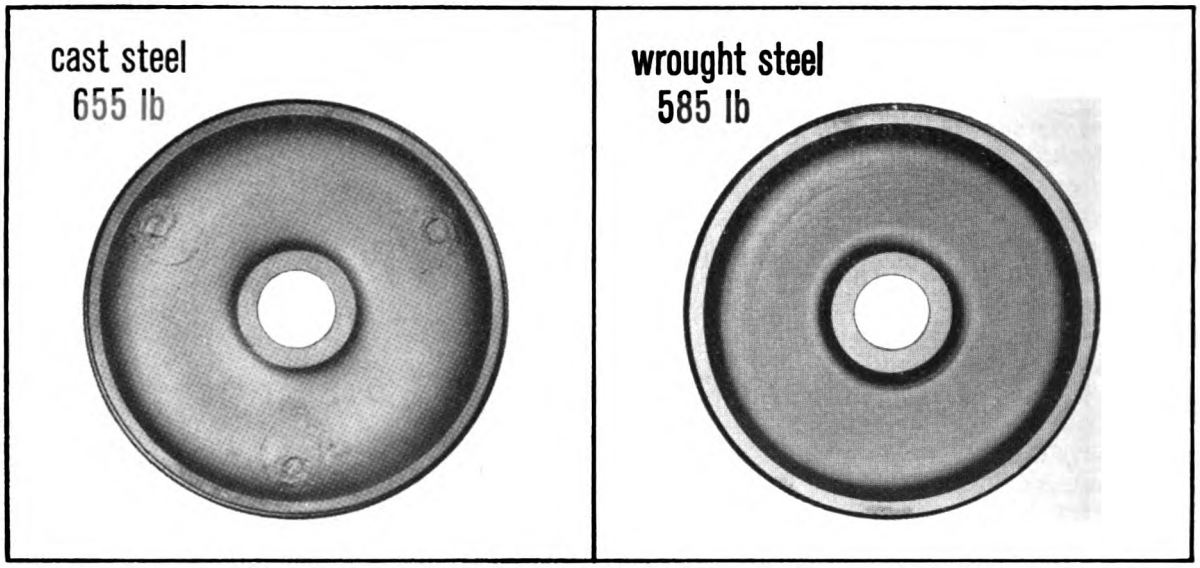
Since the linear potentiometer transducer used for measuring displacement also involves resistance changes in a balanced Wheatstone bridge, the principles used are essentially the same. Again the Brush carrier amplifier provides all necessary functional control. Except for initial calibration of the accelerometers, all signal conditioning was performed in the recording van and complete records of the comparative tests were made on the Brush oscillograph.



Force, displacement and strains—parameters of impact—are measured by transducer systems.



Mobile laboratory carries the amplifiers and oscillographs which produce tape records.



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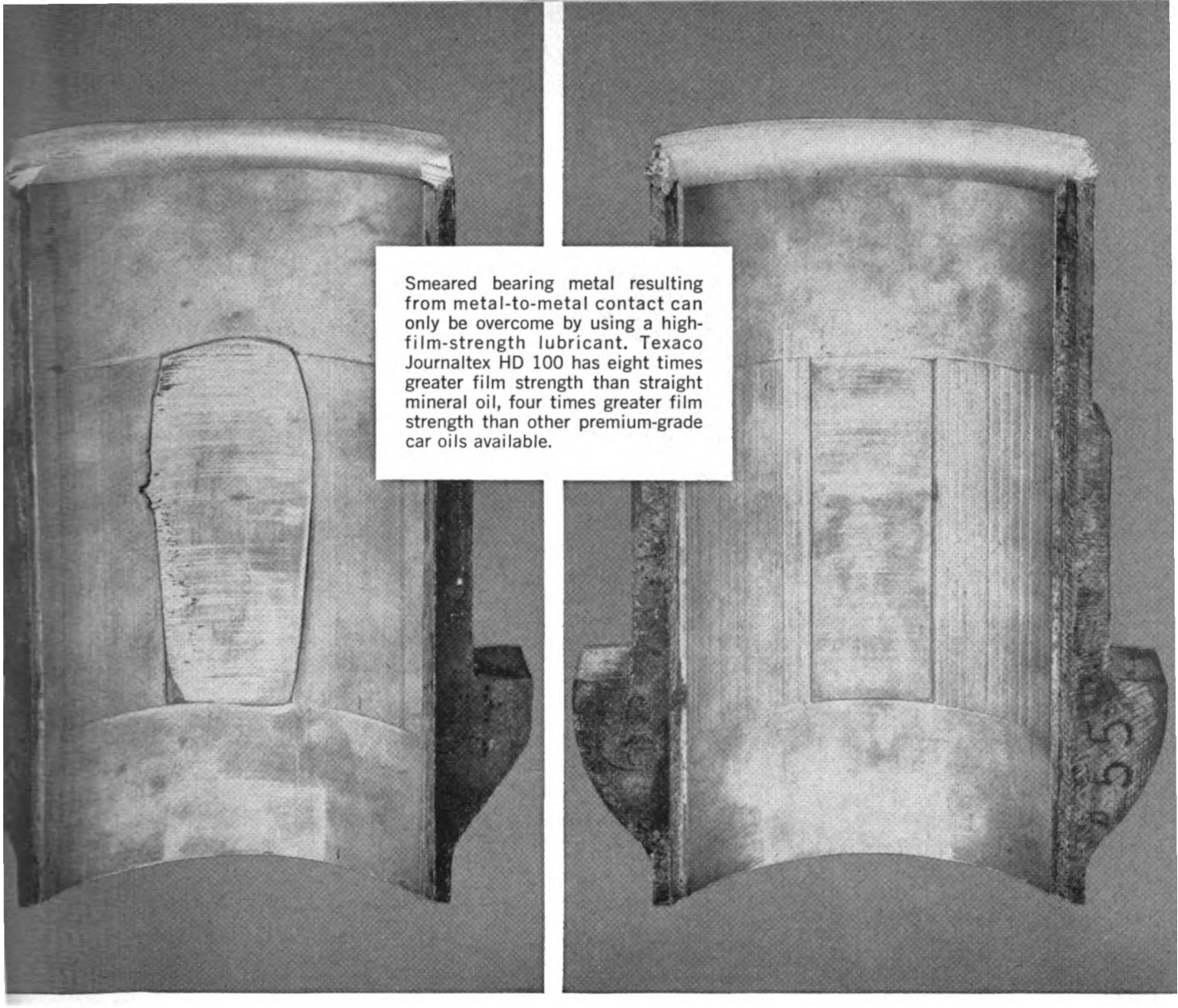
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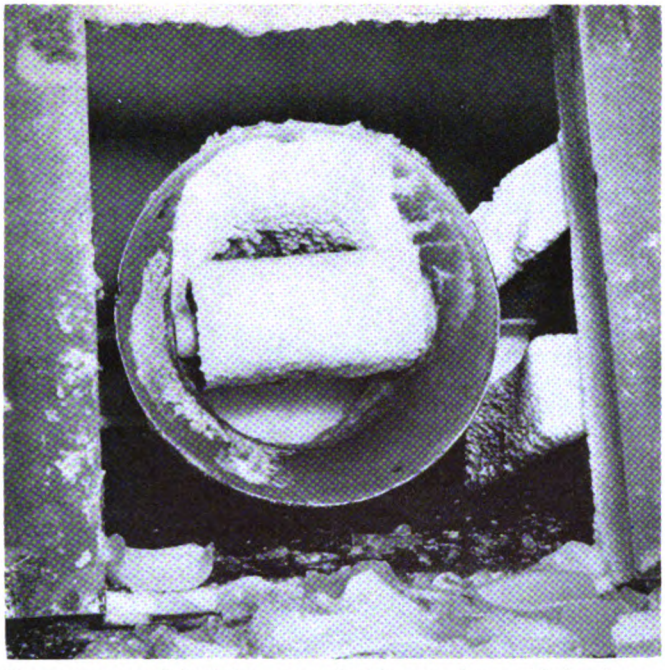
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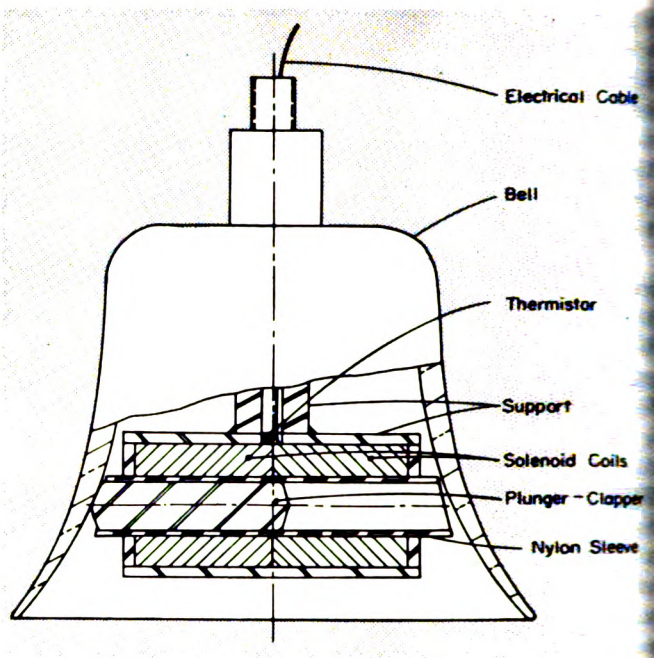
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Ringer was tested by being sprayed with water in a cold chamber at minus 40 deg F. When the circuit was turned on, the bell rang. Normally, the electric heater would prevent such an ice accumulation.



Ringer assembly is installed inside standard locomotive bell. The nylon sleeve is supported by a post extending down from top of bell. Solenoids are at ends of the tube with thermistor at center.

Solving Cold-Weather Problem . . .

Electric Ringer Overcomes Icing

By M. P. MacMartin

Electrically operated bell ringers are being tested on diesel locomotives by the Canadian National and the Canadian Pacific. Developed by the National Research Council of Canada at the request of these two roads, the design is intended to solve problems resulting from the freezing of air-operated bell ringers under certain weather conditions. The CN is planning to make additional installations, and some U.S. roads have shown interest in the new design.

The ringer has been designed to operate the bell reliably under the worst possible conditions of freezing or icing. The bell is struck by a plunger-clapper driven by electric solenoids. Solenoid currents are switched by a completely static semiconductor circuit. An electric heater, controlled by a thermostat, prevents formation of ice in the mechanism.

Mr. MacMartin is with the Electrical Engineering Section, Radio and Electrical Engineering Division, National Research Council of Ottawa, Canada—an agency of the Canadian government engaged in industrial and scientific research.

The clapper, a bar of steel, 1 in. in diameter and 4 in. long, is pointed at both ends. It slides inside a nylon tube, the ends of which extend close to the inside surface of the bell, so little ice or snow can get in. The clapper ends are bevelled so that the action of striking the bell will not produce flanges which might jam the clapper in the tube.

The two solenoid coils surrounding the ends of the nylon tube are supported and protected by a steel covering, which, in turn, is supported by a steel post running up to the top of the bell. A temperature sensing element is placed on top of the solenoid coils, inside the suppport. The coils are embedded in potting compound.

The magnetic field produced when current is passed through one of the solenoids pulls the plunger-clapper into the center of that solenoid. In so doing, the clapper strikes the bell. The current is switched alternately to each solenoid approximately 70 times per minute, and the plunger strikes the bell each time it is pulled back and forth.

The plunger must travel through the nylon sleeve in 0.06 sec to hit the bell with sufficient force to ring it properly. If the ringing rate is 70 strokes per minute, the plunger is traveling less than 10% of the time. If current is allowed to flow through the coils while the plunger is at rest, the coils get much too hot. To prevent this, the current is switched to each solenoid for only 0.1 sec, slightly longer than the time taken for the plunger to travel across the bell. Between strokes, no current flows in either solenoid.

To insure that moisture which may get into the sleeve will not freeze and hold the plunger, the temperature is kept above freezing. A thermistor measures the temperature and turns on the heating circuit when necessary. While only one of the solenoid coils is used as a heater element, the heating action is exactly the same as the ringing action. The bell does not ring because the plunger remains in the center of the coil carrying the current pulses.

If the ambient temperature of the circuit is raised, the ringing rate drops by 0.25% per deg F. For example, when the temperature was raised from 70 to 150 deg F., the ringing rate

ropped by 20%. While the circuit perates satisfactorily at 150 deg, the fe of the components would be short t such a high temperature. If it is ecessary to operate the circuits in a igh ambient temperature, suitable ɔmponents are available and could e used.

The switch used to control the cur-ɛnt to the solenoids is a silicon-con-olled rectifier, called an SCR. An CR is much like an ordinary rectifier, ɛcept that it will block current in the ɪrward direction until a small signal applied to the "gate" lead. After ɪe gate signal has been applied, the CR conducts like an ordinary recti-ɛr. It continues to conduct, even af-r the gate signal has been removed, ɪtil the load current is reduced to ɛro. In d-c circuits, it is common to turn the SCR to the blocking condi-ɔn by switching the current to an-her SCR.

SCR1 and SCR2 act as the switches permit current to flow as required ɔm the 72-volt, d-c power supply to e solenoid coils S1 and S2 which are the bell. SCR 3 acts as a current lim-iter. It turns off the current to SCR1 or SCR2 0.1 sec after either one has started to conduct and permits a small standby current to flow in the 500-ohm resistor. This reduces the total power to the coils, while ringing, to 25 watts.

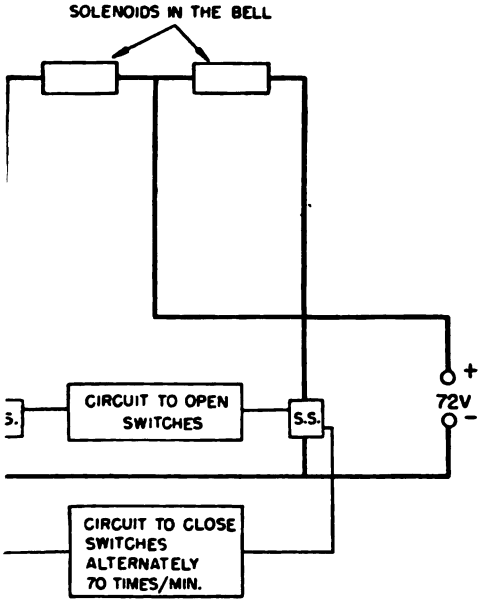
For ringing, the SCR switches are triggered on, or closed, alternately, by a transistor oscillator. UJ1 and UJ2 are silicon unijunction transistors. Current through resistor R1 causes the charge, and voltage, of condenser C1 to rise. When it reaches a critical voltage, the resistance of UJ1 suddenly changes from a high to a low value, and C1 discharges through UJ1 to trigger SCR1. Current through R2 also charges C2 to trigger UJ2 and SCR2. The two halves of the oscillator are tied through Z1 and Z2 to insure that SCR1 and SCR2 are triggered alternately. The timing while ringing is determined by the rate at which C1 and C2 can be charged up through R1 and R2. Another transistor circuit turns SCR3 on, and SCR1 or SCR2 off, 0.1 sec after either one of the latter has turned on.

When the switch is turned off, current flows through the thermistor. Reistance of a thermistor changes with temperature -2% per deg F. As the thermistor gets hotter, its resistance decreases.

If the thermistor is cold, its resistance is high, and the voltage on C1 is high enough to fire UJ1 and SCR1. This allows heating current to flow through S1, but does not ring the bell because the plunger-clapper remains in S1. SCR3 turns SCR1 off in the normal manner, and the cycle is repeated until the coils and thermistor are warm enough.

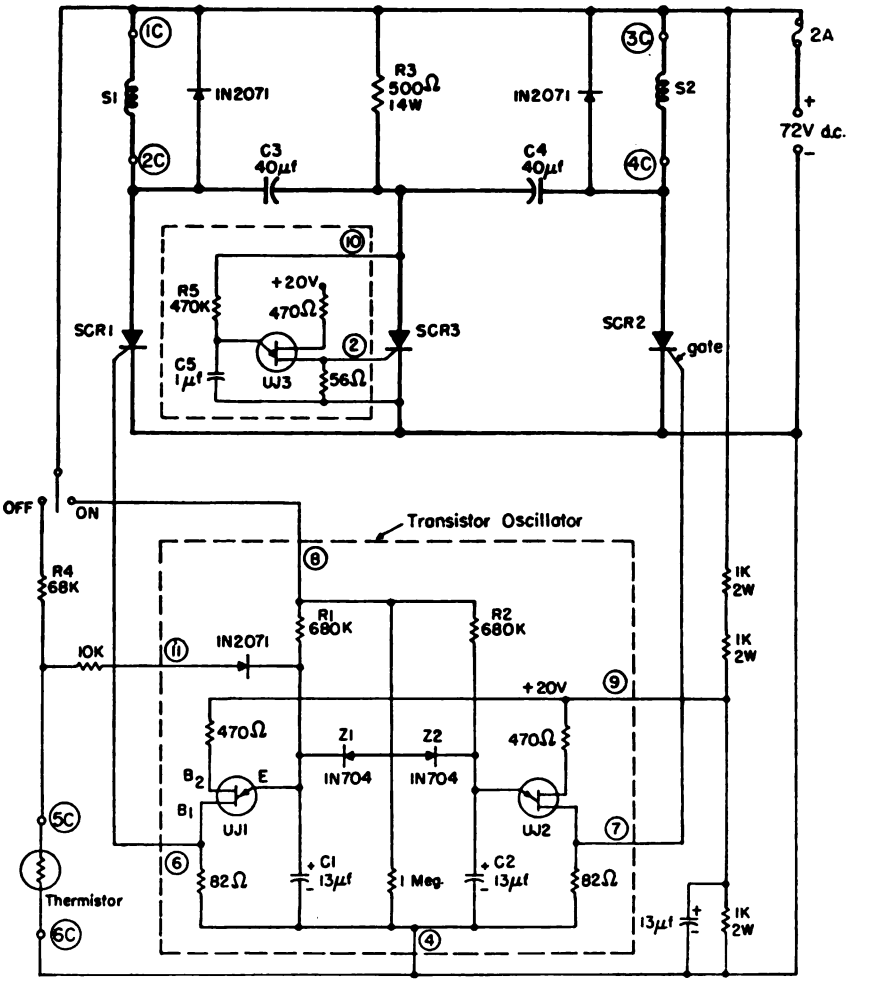
The bell ringer has been laboratory tested. The inside of the bell was coated with about 1 in. of ice at -40 deg F and the bell was rung without any heater action. About half the ice was knocked off by mechanical action in 15 sec and much of the remaining ice in 3 min. The same icing test was made with the heater on, and the action was satisfactory.

The National Research Council has not patented the arrangement, making it available for all railroads.

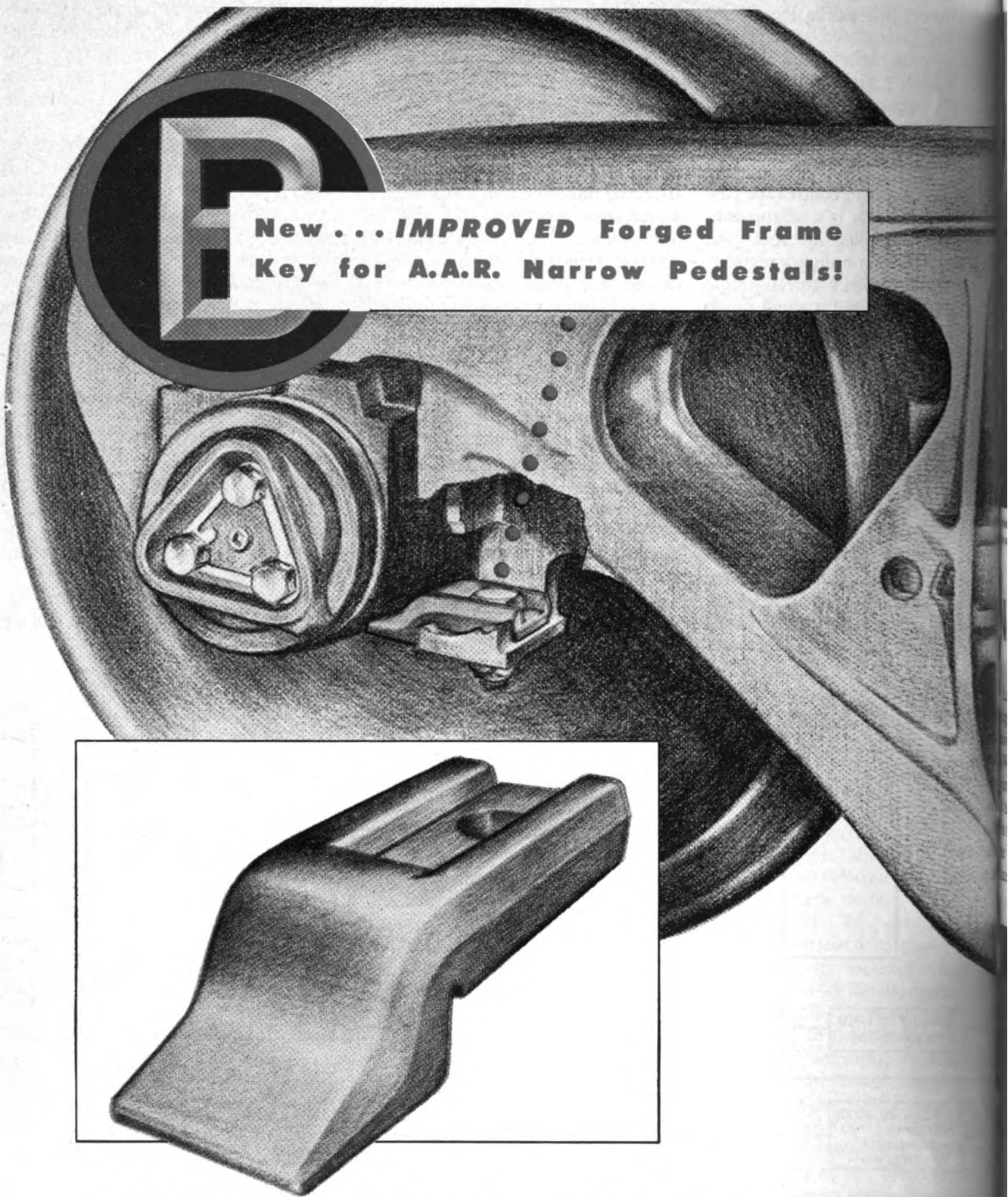


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k diagram of bell ringer circuit (above) shows the ic circuits which switch the current pulses back and h between the pair of solenoids. Tests have shown small variations of supply voltage will not affect ration but that, when voltage drops by about 40%, bell will not ring. Complete circuit for the ringer ht) indicates power circuit in heavy lines. Transistor llator is lower dotted area on this diagram. Upper ed area is transistor circuit which serves to switch l or SCR2 off 0.1 sec after either has been turned on.



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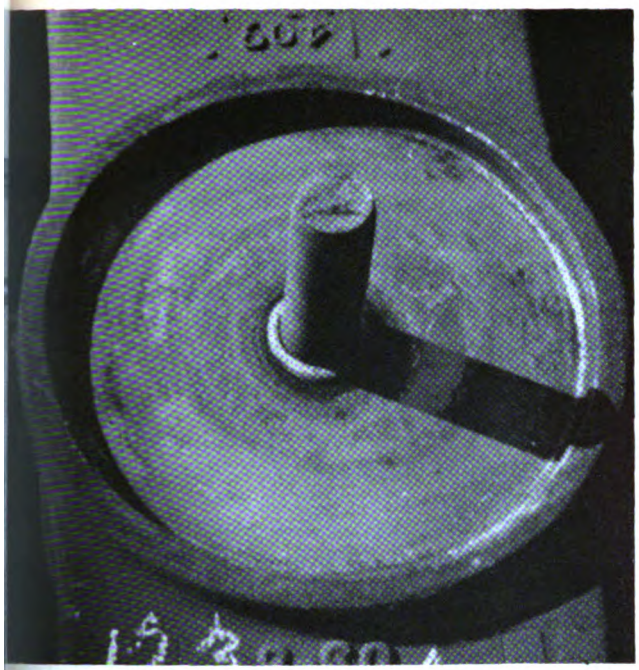
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olybdenum-disulphide lubrication on center plate was found to have iven adequate protection to machined center plate during year's service.



Graphite-grease lubrication on as-cast center plate at other end of the same car did not protect surface from galling and metal contact.

N&W Goal: Center Plate Improvements

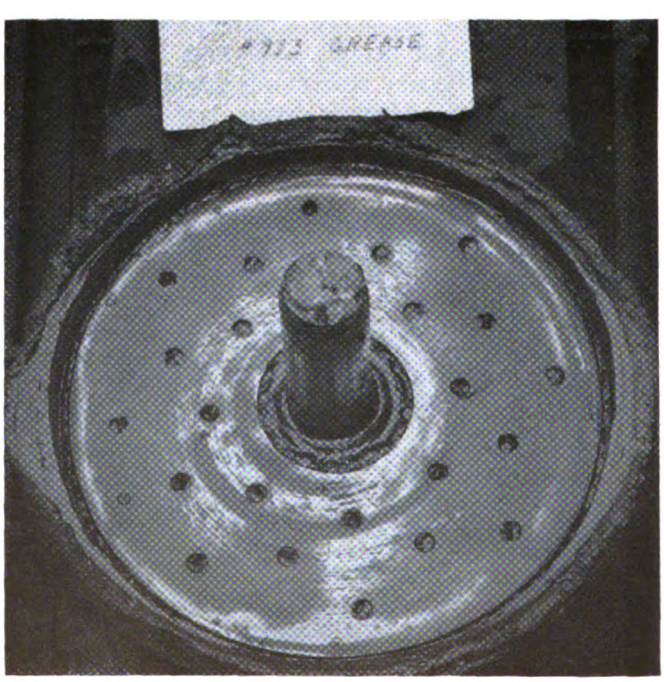
Lubrication and machining of freight-car center plates has been receiving much attention on the Norfolk & Western. Since it started about two years ago, the road has made a series of tests aimed at determining the benefits to be derived from the finishing of the body and truck center-plate surfaces, and from providing satisfactory lubrication for this important bearing area.

The N&W is now machining both the body and truck center plates of all new cars. Each center plate is then lubricated with 1 oz of molybdenum disulphide dispersed in an approximately equal volume of petroleum solvent. Measurements of wheel-flange wear and examination of the center plate surfaces are being made at intervals on these cars and on some others equipped with special center-plate wear and lubrication arrangements.

It seems generally agreed that any arrangement which would involve highly finished and completely lubricated center plates might give unsatis-



ardened metal liner lubricated with standard grease was dry after nine months of service, and center plates were still in good condition.



Chrome-plated disc with special soft grease was still adequately lubricated when compared with the car's other center plate (left).

factory performance — introducing truck shimmy and aggravating flange wear. N&W mechanical officers have determined, however, that some finishing and lubrication are desirable to reduce the wear of the two center-plate surfaces and to prevent erratic truck swiveling which may result if the surfaces are, or become, rough and irregular. Relatively free swiveling of trucks is expected to prevent journal bearings from being loaded improperly, alleviating one cause of bearing failures and reducing the rate of bearing wear.

Actually, the finishing and lubrication of center plates, if nothing else, serves as a break-in procedure which is expected to pay for itself on new cars. Certain cars which have been designated for test service have a machined and moly-lubricated center-plate assembly at one end and the conventional, as-cast center plates with standard grease-lubricant at the other. Some of these cars have been inspected after one month's service and again after a year's operation. "Machining and moly lubrication for the break-in period is a good practice," one N&W officer commented recently. "In every case these center plates were in near-perfect condition, well distributed bearing over the center-plate surface, with no significant galling. On the unmachined, grease-lubricated center plates, the bearing surface was well below 50% of the total area. The majority of the plates had some galling—some of them were badly galled."

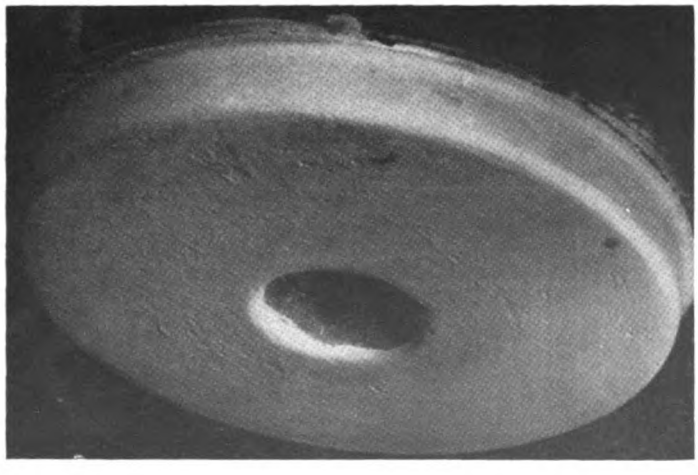
Referring to wheel wear studies which were also part of this investigation, he reported that tread contours were recorded on the new test cars, then taken after one month, and again after one year. No difference could be detected in wheel wear between the two trucks with the different surfaces and lubricants, he said. "Practically all the wear took place within the first month of service. The wear is largely in the throat of the flange, and we attribute it to the difference in the shape of flange throat and the rail head. It is interesting that this high wear took place before the center plate lubrication was all gone."

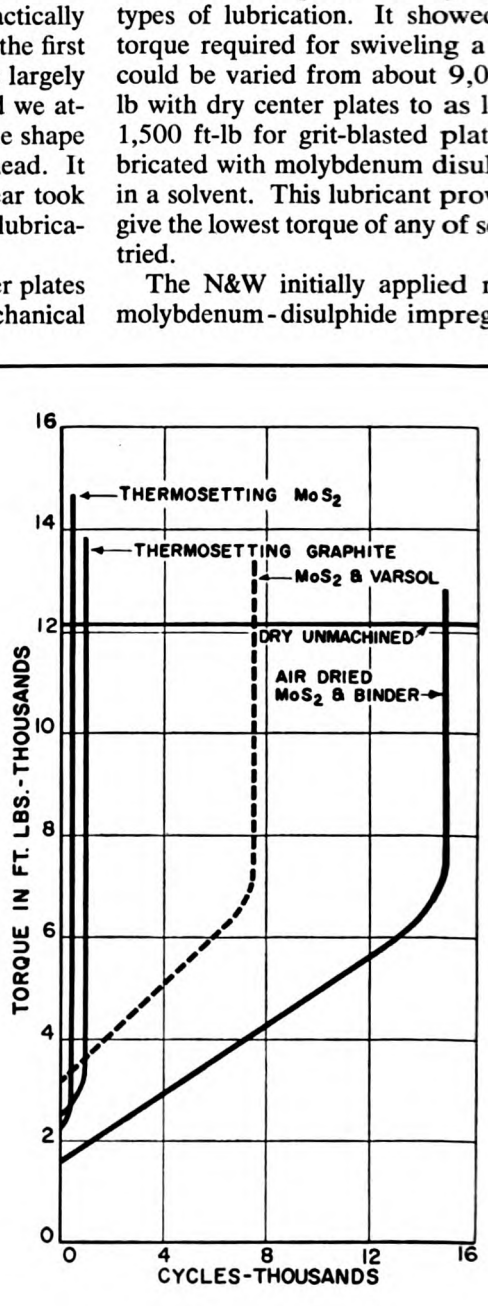
All this N&W work on center plates was started after the AAR Mechanical Division distributed to member roads the report of an investigation made by the Canadian Pacific. The CPR has adopted the practice of having the center plates for new cars either grit-blasted or shot-blasted, followed by an application of 2 oz of a 50/50 mixture of molybdenum disulphide powder and an inexpensive evaporative solvent as the carbody was placed on the trucks. The CPR used this procedure on 1,966 cars built in 1959 and rated the results worth while, at least for break-in. It was found that cost was little different from that of applying conventional grease. The CPR also made torque measurements under a 64,000-lb load with finished and unfinished center plates having various types of lubrication. It showed that torque required for swiveling a truck could be varied from about 9,000 ft-lb with dry center plates to as low as 1,500 ft-lb for grit-blasted plates lubricated with molybdenum disulphide in a solvent. This lubricant proved to give the lowest torque of any of several tried.

The N&W initially applied nylon-molybdenum-disulphide impregnated

CN Center-Plate Tests

Canadian National has made laboratory tests with various center-plate lubricants (RL&C, December 1961, p 24). While it was found that conventional lubricants serve primarily as break-in compounds, later work with the special test machine has shown a material which may give lubrication for longer periods. Molykote 88, molybdenum disulphile in an epoxy binder, was applied to both center plates 1/16 in. thick. After air drying, tests showed that this might provide lubrication for up to six months.





nter-plate lubricator discs to fifty -ton hoppers with as-cast center ates. Inspections made after a few nths indicated that the plates were about the same condition they uld be with standard graphite ase. By this time, the N&W had dertaken the construction of the st 1,000 of its 85-ton hopper cars L&C, April 1960, p 37; Nov. 1960, 25). Practically all these cars were uipped with fully machined center ates and moly lubrication. Since n, 80 70-ton open hoppers and 70 vered hoppers have also been put o service with this center-plate atment. Indications are that all se cars are performing satisfactori- based on inspections mentioned ove. In addition, 15 cars have been uipped with two types of moly-im- gnated, plastic-disc, center-plate rication, and another car with a ir of hardened-steel discs drilled th a series of holes to retain grease. The steel discs were installed be- een the two machined center-plate rfaces as the car was placed on the icks. On the test car, one of the cs has been chrome plated and the ier remains in its original condition. spections made after nine months' vice showed the discs and center- ate surfaces to be in good conditon. ie hardened plate surfaces were lishing as were the body center ates, themselves. The discs had ap- rently not moved on the bolster cen- plate surfaces. The end with the rome-plated disc had been lubri- ed with a grease having a consist- cy softer than that of the conven- nal center-plate grease used on the ier end. The softer grease was ap- rently continuing to lubricate the faces, while the other center plate s dry.

The N&W points out that, were -in. steel discs to be used, it would necessary to increase the height of flange on the bolster center plate maintain the proper engagement be- en the two center plates.

The plastic discs have also been ved to lubricate machined center- te surfaces satisfactorily. While its tial work was done with nylon lubri- ors between as-cast center plates, latest results with finished plates licate that surfaces can be protected inst wear and gouging. They pro- ted the surfaces through eight nths' service, preventing metal-to- tal contact.

From the Diesel Maintainer's Note Book

Typical Days With Doc Watts

By Gordon Taylor

It had been a rough day at Centerville diesel shop, and Doc Watts thought that nothing else could possibly happen. About that time the loud speaker in the shop blared out a call for Doc to come to the office to answer an important phone call.

As Doc entered the office, the General Foreman said, "Engineman Mike Murphy is stranded with a two-unit F9 locomotive at the foot of Signal Hill. He has phoned for help. Thinks maybe you can 'talk' him back to town. He is waiting on the phone."

Doc picked up the receiver and said, "What seems to be your trouble, Mike?"

"Well, it's like this," said Mike, "the lead unit might as well have stayed home. The engine is running but doesn't put out any power."

"I'm sure glad that the engine will run," said Doc. "That gives us a starting point. Now tell me, does the engine speed up when the throttle is opened?"

"It doesn't."

"That means we'll have to check more things than we would if the engine responded to the throttle," said Doc. "First thing to check is the ground relay. Has it tripped?"

"I thought of that," Murphy replied. "It's not tripped."

"Next on the list," Doc continued, "are the Engine Run switch and the Control and Fuel Pump switch. Is either of these switches open?"

"Neither one," said Mike. "They were closed when the trouble started and I haven't bothered them."

"Well, Mike, you surely must have received some alarm or light. What about the NVR light—the blue one that tells you there's been an alternator failure?"

"Oh, didn't I tell you that?" asked Mike. "Guess I got a bit excited and failed to tell you that the blue light did come on."

"Now you have given me something definite to work on," said Doc. "There are five things you should check Write these items down; check them on your locomotive, and I'll bet you will soon be headed home:

First, check the 30-amp auxiliary generator field fuse;

Second, check the 150-amp auxiliary generator output fuse;

Third, check the 35-amp alternator field fuse;

Fourth, check the control knife switch. It should be closed.

Finally, check for a loose governor cable plug at the receptacle on the governor.

One of these should get you out of trouble. Tell the operator to phone me when you get under way again. I'll wait near the phone."

"You sound mighty confident that one of those things will get me out of trouble," said Murphy as he hung up.

But in about twenty minutes the tower operator did call, saying "Doc, I guess you have done your Boy Scout deed for today. Mike's train is on the way home and he looked very happy as he passed here."

When Doc hung up the phone, his boss, the General Foreman said, "You cleared up what seemed to be turning into a bad delay. How do you do it?"

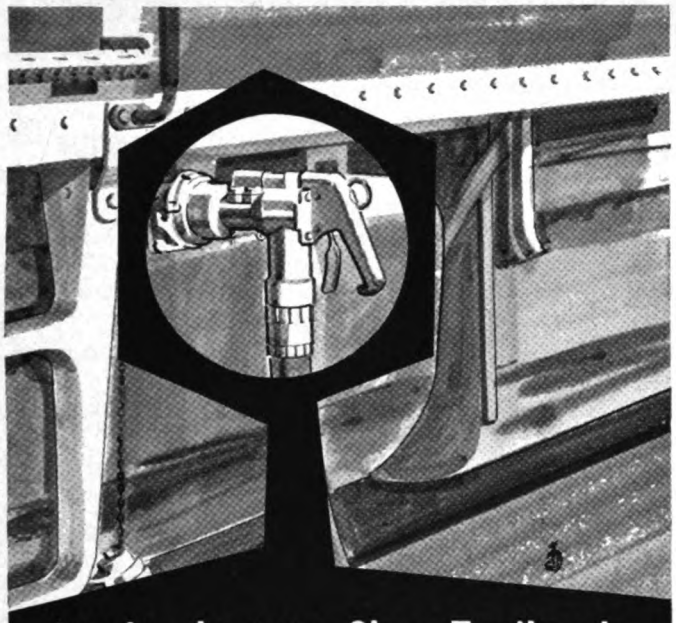
"No secret," said Doc; "you just draw on your past experience and check against the mental picture that you have of what is necessary to make a diesel tick. Right now I'm anxious to learn just what Mike found; it must have been one of the items I told him to check. The cause should be reported on his trip report when he gets in."

Mike's report showed that the governor cable plug was loose. When the plug was tightened in the receptacle, his diesel was soon back in business.

The next morning Doc had the electricians closely examine the governor cable on the unit that had failed. They also checked the supply of spare fuses. This served to center attention on the various fuses. Fred Newman, one of the younger electricians, spoke up. "Doc, we have fuses or circuit breakers protecting various direct-current circuits. Why aren't there any fuses between the alternator and the a-c motors driving traction motor blowers and radiator cooling fans?"

(CONTINUED NEXT MONTH)

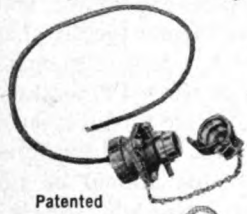
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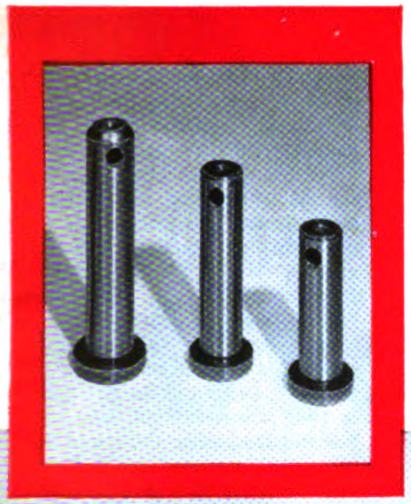


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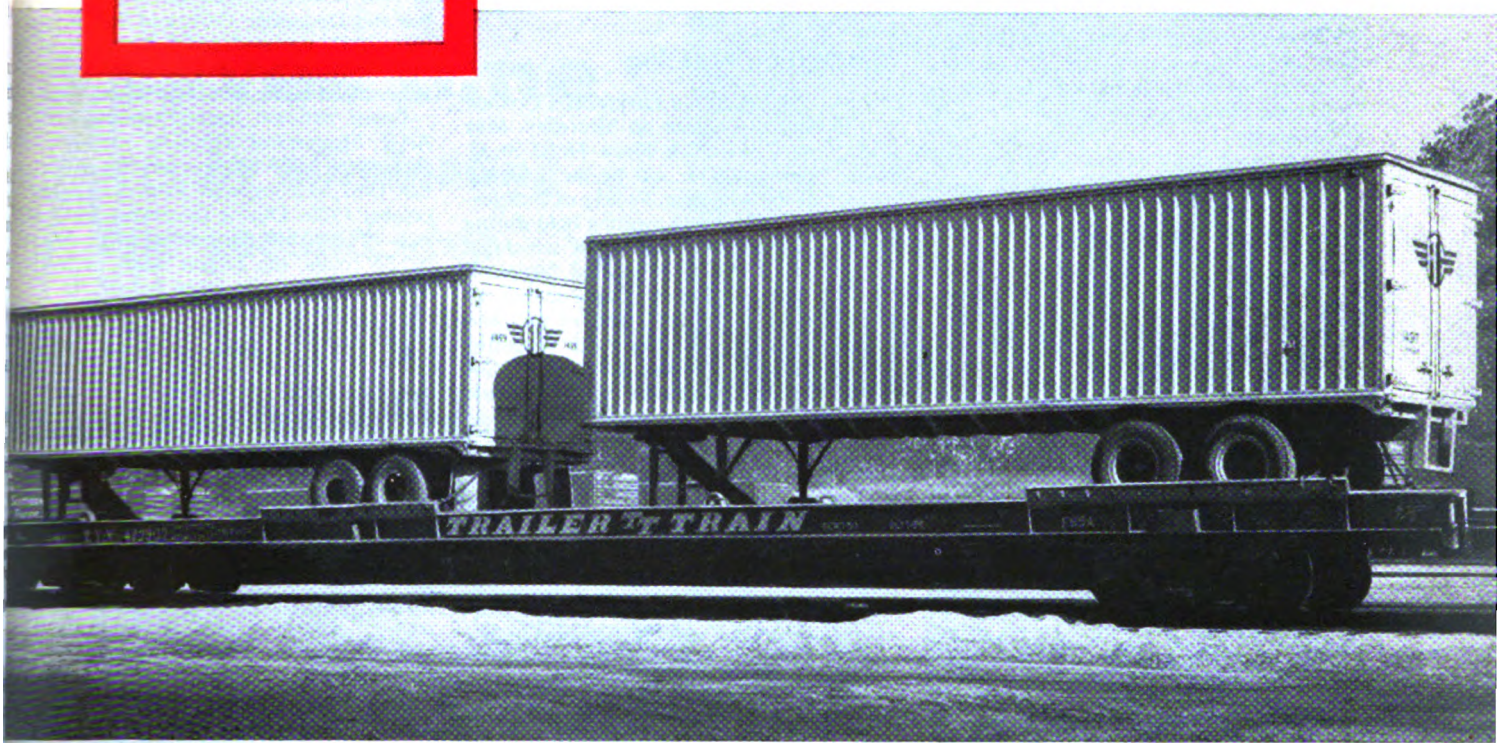


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Railroad Division

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Report

(Continued from page 5)

pecially on road freight diesels, the Commission reported. After considering the running inspections, answering of alarms, and correction of malfunctions by firemen, the Commission concluded that "mechanical duties now performed by firemen helpers on [diesels] involve a small proportion of the total time on duty, are relatively minor, and are not essential to safe operation. The infrequent minor malfunctions which do occur can be handled by the engineer. If they are more serious, the services of skilled maintenance personnel called to handle the emergency will still be required, as at present."

Issuance of the Commission report has been met with the opposition of the operating unions and threats of strike action. Railroads hailed most of the conclusions.

B&O Building Piggyback Trailer Vans

The first aluminum trailer van to be constructed in a railroad shop was recently completed at the Mt. Clare, Baltimore, shops of the Baltimore & Ohio, the railroad reports. A program has just started there to build 49 additional demountable trailer bodies following impact testing.

The completed unit measures 40 ft x 8 ft x 8 ft and has a capacity of 2,550 cu ft, 11% more than the 36-ft trailers now used in B&O TOFCEE service. It is said to be 41% lighter than conventional units of the same size. When the new order is completed, the road will have 759 units of all types in service.

Interlocking aluminum extrusions developed by Reynolds Metals Company's Product Development Division are used. First introduced in 1956 for refrigerator car flooring, they have also been used in full-door box-car doors, bulkheads, and car linings. Because the aluminum panels snap together, they do not require fastenings, and the B&O reports that cost per unit will be substantially lower than for conventional construction. Initially, Reynolds will supply more than 230,000 lb of extrusions for the program.

Lubrication Meeting

The National Railroad Lubrication Council will present a program on Thursday, May 10, at the Chase-Park Plaza Hotel in St. Louis. This program will be the Railroad Session of the American Society of Lubrication Engineers' annual meeting held during the week of May 6. One paper scheduled for the session will be entitled "Application of Hydrodynamic Transmission to High-Powered Diesel Locomotives" and deals specifically with the Voith transmission in the Krauss-Maffei locomotives now under test by the Denver & Rio Grande Western and the Southern Pacific.

Hot Boxes Dropping To All-Time Low

Latest information indicates that practically all railroads and private car operators will meet the May 1 date set by Interchange Rules for the universal application of journal lubricating devices. Reports made three months ago indicated that, at that time, only 4% of the interchange freight cars had waste-packed boxes. It was anticipated that there should be no difficulty in completing lubricator applications by May.

As the journal lubricator program neared completion, the national hot-box performance and performances established by individual railroads are setting new records. H. M. Wood, assistant chief mechanical officer - car, of the Pennsylvania recently reported that the PRR had 16,000 hot-box set-offs in 1957 and only 3,800 last year. For 1957 the Pennsylvania performance was 145,600 miles per hot box set-off; in 1961 it was 513,000 miles. "In November and December 1961, and again in January 1962, we produced better than a million miles per hot box, a figure we never approached in the past, Mr. Wood reported.

Latest national figures reported by the AAR Mechanical Division indicate that there were 2,939 hot-box set-offs in December 1961 as compared with 5,515 in December 1920. During December 1961 mileages of 1,000,000 per hot box were reported by 26 roads, the largest being 4,764,119. Monthly figures are given below.

	Cars set off between terminals with hot boxes		Miles per car set off
December 1956	6,692		438,4[illegible]
December 1957	5,719		462,47[illegible]
December 1958	7,511		350,39[illegible]
December 1959	6,121		435,71[illegible]
	Pads	Waste	
December 1960	2,314	3,201	441,443
1961			
January	2,298	3,883	378,50[illegible]
February	1,994	4,679	332,70[illegible]
March	2,252	4,132	398,42[illegible]
April	2,098	3,702	448,13[illegible]
May	2,191	5,016	363,15[illegible]
June	2,193	6,608	293,33[illegible]
July	2,323	7,140	266,45[illegible]
August	2,356	6,785	285,35[illegible]
September	2,072	4,736	377,59[illegible]
October	2,092	2,681	574,39[illegible]
November	1,844	1,359	821,83[illegible]
December	2,002	937	865,51[illegible]

Orders and Inquiries for New Equipment

Placed Since Closing of March Issue

Passenger-Car Orders

NEW YORK CITY TRANSIT AUTHORITY. — *St. Louis Car:* 540 subway cars. Approximate cost, $60 million. Two sample cars to be delivered within seven months. Deliveries to be completed in March 1964.

Freight-Car Orders

ATLANTIC COAST LINE.—*Company shops:* 90 54-ft, 3-in., 50-ton capacity flat cars for gypsum-board industry. Cost, over $1,000,000. Car frames to be solid steel castings made by General Steel Industries. Trucks, brakes, and wooden decking to be applied at ACL shops. Cars to be equipped with lading band anchors and special lockers at one end for shipping packaged materials used for applying gypsum board. Ten cars to have a special side stake arrangement. All will have roller bearings.

CANADIAN NATIONAL.—*National Steel Car:* 500 50-ton, 50½-ft box cars with 16-ft door openings. For June-July delivery. 100 70-ton steel covered hopper cars. For May-June delivery.

CHICAGO & NORTH WESTERN.—*General American:* 25 50-ft insulated box cars equipped with 15-ft doors, Hydra-Cushion underframes, load dividers and roller bearings. Cost, approx. $18,000 each. For delivery starting in July.

CANADIAN PACIFIC.—*Dominion Steel & Coal:* 200 flat cars. Cost, $2,200,000.

GULF, MOBILE & OHIO.—*General American:* 75 insulated box cars. Approximate cost, $1,250,000. For mid-July delivery.

ILLINOIS CENTRAL.—*Thrall Car:* 25 52½-ft, 70-ton covered gondola cars with adjustable bulkheads and removable sliding roofs. Cost, $11,600 each.

NORTH AMERICAN CAR.—*General American:* 14 2,600-cu ft capacity covered hopper cars for granular products. Cost, $182,000. *Bethlehem Steel:* 3 85-ft, 70-ton, roller-bearing flat cars for piggyback service. Cost, $53,000.

NORTHERN PACIFIC.—*Pacific Car & Foundry:* 50 70-ton mechanically refrigerated cars to be equipped with roller bearings and cargo protection fixtures. Estimated cost, $1,400,000. *International Car:* 50 all-steel, radio-equipped, cupola type cabooses. Cost approximately $1,025,000. Both orders for August delivery.

SOUTHERN PACIFIC.—*Greenville Steel Car:* 500 70 70-ton insulated box cars. Cost of insulated box cars $1,452,150. For May 9-28 delivery. *Magor Car:* 100 aluminum covered hopper cars. *Thrall Car:* 7 rack cars.

SOUTHERN PACIFIC. — *Greenville Steel Car:* 500 100-ton, 2,100-cu ft capacity, selective unloading, open-top hopper cars. Built from designs developed by SP's mechanical department. Completed in March.

TORONTO, HAMILTON & BUFFALO.—*National Steel Car:* 30 70-ton covered hopper cars. For May delivery.

UNION TANK CAR CO.—*Company shops:* 65 tank cars—capacities: (15) 30,000 gal; (1) 20,000 gal; (5) 12,000 gal; (25) 10,000 gal; (18) 8,000 gal; (1) covered tank hopper.

U.S. DEPARTMENT OF THE INTERIOR.—*Magor Car:* 25 helium cars.

Notes and Inquiries

Canadian National equipping 100 box cars with damage-reducing devices. Fifty being compartmentized with Pullman-Standard bulkheads and 50 with International Equipment Co. bulkheads. Covered hopper cars, order for 200 of which were reported in March issue, will all be aluminum tank type, not just 135.

New York, Susquehanna & Western's request for a government guaranty of a $555,000 loan to finance purchase of three EMD 1,800-hp diesels (RL&C, Nov. 1961, p 10) approved by ICC.

Letter to the Editor

Journal-Bearing Economics

TO THE EDITOR:

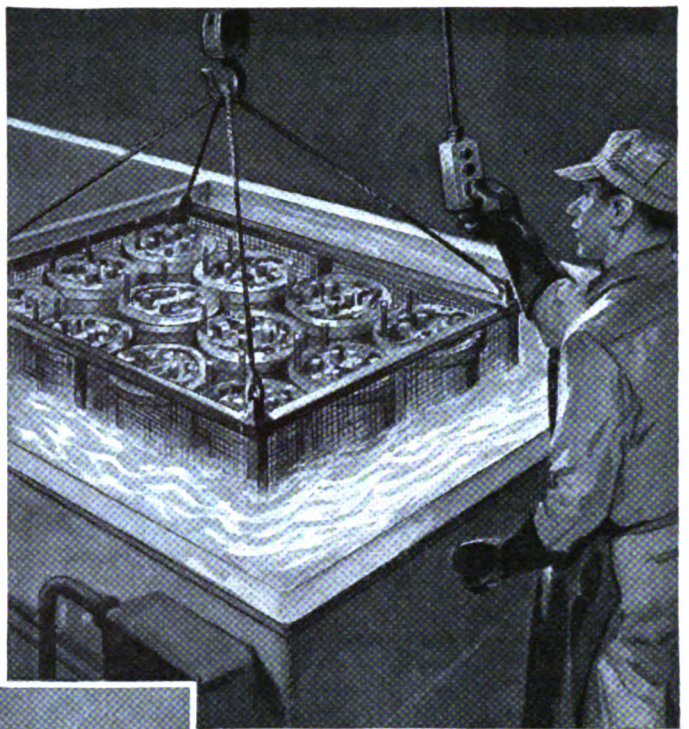
In your editorial "Journal Bearing Economics" (RL&C, Feb. 1962, p 14), you state that you doubt that the conclusions made by Magnus will go unchallenged and that a study of the current economics of both plain and roller bearings by an unbiased agency would be worthwhile. You further state that the AAR could perform a real service by up-dating all of Report 20000.

I believe Magnus has accomplished its purpose in publishing this report at this time. Attention has been directed to the fact that, with the very much improved hot-box performance for solid bearings with lubricator pads, the economics of solid-versus-roller bearings has changed. One must conclude then that from a Magnus point of view this report is timely.

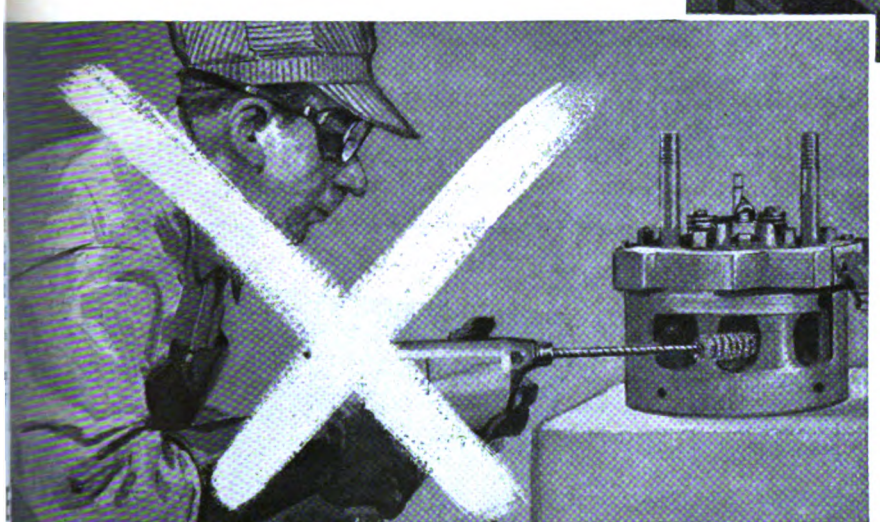
However, the hot-box performance is still changing, perhaps radically. It can be shown mathematically that, as the miles per hot box with pads is four times that with waste, then the first 4% of cars equipped with pads

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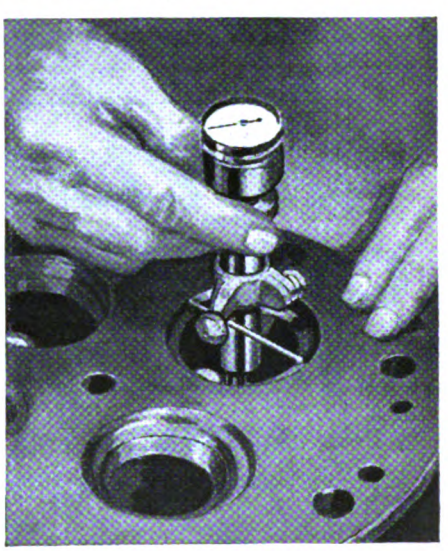
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will produce a 3% increase in miles per hot box over that with all cars on waste. However, the last 4% of cars to be equipped with pads (96% to 100%) will produce an increase in miles per hot box equal to 43% of the miles per hot box with all cars on waste. The final few percent of cars equipped, therefore, produces considerably more improvement in the miles per hot box than does the same percentage of cars applied initially in the program.

As of January 1, 1962, it is estimated that about 4% of the serviceable cars remained to be equipped with pads. Other conditions remaining the same, this 4% of cars when equipped could produce an increase in miles per hot box equivalent to approximately 12% of that which obtained on January 1, 1962, when only 96% of the cars were equipped. Therefore, I can not agree with your position that the AAR should up-date Report 20000 at this time. If all railroads fulfill their obligation and all cars are equipped with pads by May 1 of this year, the hot-box performance should improve over the present performance. It would be much more desirable to use factual data in the up-dating of Report 20000 than to attempt to project current figures. I do not believe the data should be used until all cars are equipped and a year's performance record is available. Therefore, it seems to me that the time for the AAR to up-date Report 20000 will be some time after May 1963, rather than at the present time.

M. A. Pinney,
Engineer of Tests, Pennsylvania

Personal Mention

Canadian National.—*Moncton, N.R.:* JAMES PATTERSON appointed master mechanic. DAVID SHAW appointed master mechanic, Maritime Area south of Truro and the Oxford subdivision.

Chesapeake & Ohio.—*Richmond, Va.:* T. P. HACKNEY, JR., appointed assistant to chief mechanical officer. T. G. SPATIG, assistant mechanical engineer, appointed mechanical engineer, succeeding Mr. Hackney. W. J. DUFFY and E. F. STARK, JR., appointed assistant engineers.—*Russell, Ky.:* F. B. HALL appointed mechanical supervisor—diesels. *Huntington, W. Va.:* C. O. BARNETT appointed system boiler inspector.

Elgin, Joliet & Eastern.—*Joliet, Ill.:* VIRGIL V. BROWN appointed general car inspector and loading rules supervisor, succeeding JOSEPH A. GOVERT, retired. WILLIS D. WOOD appointed car foreman. THOMAS J. PYKA appointed general enginehouse foreman, Gary Mill yard, succeeding WILLIAM E. LANKFORD, retired. ARTHUR S. KIPPER appointed assistant diesel supervisor and shop foreman, Kirk Yard, succeeding Mr. Pyka.

Interstate Commerce Commission.—*Minneapolis, Minn.:* STEDMAN V. WADMOND, inspector of locomotives, Bureau of Safety and Service, retired.

Louisville & Nashville. — *South Louisville, Ky.:* J. M. WOOD, appointed assistant departmental foreman. *Bruceton, Tenn.:* J. N. PRINCE appointed departmental foreman. *Leewood, Tenn.:* J. W. ROGERS appointed departmental foreman.

Milwaukee.—*Milwaukee, Wis.:* F. A. UPTON appointed assistant chief mechanical officer, with jurisdiction over locomotive, car, and mechanical engineer organizations. A. W. HALLENBERG, district master mechanic, ap-



F. A. Upton



A. M. Hallenberg

pointed general superintendent motive power, succeeding Mr. Upton.

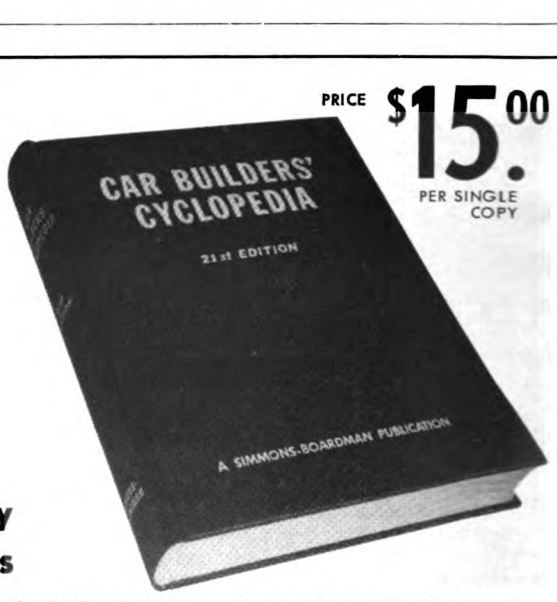
Mr Upton began service with the Milwaukee in 1939 as a machinist apprentice at Perry, Iowa, subsequently becoming enginehouse foreman and general foreman at Milwaukee; master mechanic at Miles City, Iowa; master mechanic at Chicago, and assistant superintendent motive power, super-

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tendent motive power, and general superintendent motive power at Milwaukee.

Mr. Hallenberg became a machinist apentice at Minneapolis in 1929, subsetently serving as a machinist; night enehouse foreman at St. Paul; assistant aster mechanic and division master meanic at Deer Lodge, Mont.; district mas- mechanic at Chicago, and district master echanic at Milwaukee.

orthern Pacific.—*St. Paul, Minn.:* R. C. ORBES, valuation inspector, appointed meanical valuation engineer, succeeding . W. HEMSWORTH, retired.

chmond, Fredericksburg & Potomac.—*Richond, Va.:* J. A. W. SMITH appointed mas- mechanic. S. D. BRYAN appointed enneer-shops, methods and planning. Forerly assistant mechanical engineer. R. G. ELFE appointed supervisor diesel equipent. M. E. NUCKOLS appointed general reman diesel maintenance, succeeding r. Selfe. N. A. NELSON appointed diesel pervisor, succeeding Mr. Nuckols. D. A. AVIS, acting assistant diesel supervisor, apointed assistant diesel supervisor, succeedg Mr. Nelson.

. Louis Southwestern. — *Pine Bluff, Ark.:* W. BELLHOUSE, assistant superintendent echanical department, appointed superinndent mechanical department, succeeding . V. MYERS, retired.

aboard.—*Portsmouth, Va.:* H. D. BARNES pointed shop superintendent, succeeding . W. MCALPINE, retired. *Hamlet, N. C.:* . H. SEBRELL appointed assistant superinndent car department, succeeding Mr. arnes. Mr. Sebrell formerly chief draftsan at Richmond, Va.

OBITUARY

dney Withington, 77, retired chief electrical gineer, New Haven, died Feb. 13, at New aven, Conn.

upply Trade Notes

PEER CARBON CO.—*Speer Carbon,* a cently acquired subsidiary of *Air Reduon Co.,* has announced a $5½ million exansion program at its St. Marys, Pa., lant.

■

RANSON EQUIPMENT CO. — *Circo orp.,* a wholly owned subsidiary of Branon Instruments of Stamford, Conn., has hanged its name to the Branson Equipment o., which will continue to produce Circo ashers and degreasers, and to market Perolv and Circo-solv, also Cobra cleaning ompounds for industrial washers.

■

RENCO, INC.—A roller-bearing plant ompleted late last year adjoining the Interate Highway near Petersburg, Va., has an itial production area of 30,000 sq ft. Ultiately, manufacturing facilities will occupy 0,000 sq ft and will be supplemented by a eparate 10,000 sq-ft office building.

■

ENERAL AMERICAN TRANSPORTATION CORP.—A new tank car facility, replacing the company's paint shop destroyed y fire in October 1960, was dedicated at



You can eliminate fuel injector cleaning problems by using LIX Diesel Cleaner. It soaks away all grit, grime and burned-on carbon without brushing or scraping. Leaves no granular deposits either... a simple rinse with water or mineral spirits puts fuel injectors ready for service.

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Sharon, Pa., on March 6. The building, costing in excess of $1.5 million, has a total area of 117,000 sq ft in contrast to the 77,000 sq ft of the old structure. Four tracks run through the 950-ft length of the building, at the end of which an 85-ft, 10-wheel transfer table of 60 tons capacity moves cars laterally as much as 104 ft to reverse the flow between inbound and outbound tracks. Work stations are situated along each track. The traveling spray booth is equipped with its own motive power and moves on its own rails, straddling a car to paint it.

■

HUCK MANUFACTURING CO. — *Rolland E. Rowse* appointed manager of Tool Sales and Service Department.

■

AMERICAN HAIR & FELT CO.—*William J. Berry* appointed manager industrial sales, including sale of felt products to the railroads.

■

CITIES SERVICE OIL CO.—*Tom E. Burke* appointed assistant manager, National Railway Sales.

■

LINDE CO., DIVISION OF UNION CARBIDE CORP.—Oxweld Railroad Department now marketing all Haynes Stellite products to all U.S. railroads.

■

SIMMONS-BOARDMAN PUBLISHING CORP.—*Robert H. Lash,* director of circulation, elected a vice-president. *Frank T. Baker,* Eastern district manager - railway sales, elected regional vice-president - sales.

NATIONAL REFINING CO., DIVISION OF ASHLAND OIL & REFINING CO.—*John E. Shiffler* named manager, railway sales. Mr. Shiffler formerly a sales representative, railway sales department, in Cincinnati, Ohio, where he will remain for an indefinite period, eventually establishing headquarters in Ashland, Ky. *William S. Guth* is regional sales representative for railway sales in Chicago, and *Howard D. Plumley* is regional sales representative in Baltimore, Md.

■

PULLMAN-STANDARD. — *Charles R. Radey* appointed assistant general manager of freight-car engineering for all P-S plants.

■

GARLOCK INC.—*James P. Naughton* appointed manager, Railroad Sales, succeeding *Norman C. Schlegel,* deceased.

■

BULLARD CO.—*H. Edward Neale* elected vice president-sales.

■

CLINTON CO.—*Aldon Co.,* 3338 Ravenswood ave., Chicago 13, named national railroad sales representatives for Clinco epoxy coatings, compounds and adhesives.

■

CHAMPION RIVET CO.—*Patrick R. Rogers* appointed a sales representative at East Chicago, Ind.

■

SAFETY ELECTRICAL EQUIPMENT CORP.—*Charles W. McElroy,* chief engineer of air-conditioning equipment, appointed assistant sales manager, railway products.

McCONWAY & TORLEY CORP.—*Thomas G. Gerosky* appointed manager, district sales.

■

SPARTON CORP., SPARTON RAILWAY EQUIPMENT DIV.—*J. C. Marchand* appointed West Coast representative.

■

VAN PRODUCTS CO.—*Dana B. Griffin* sales manager, appointed vice-president in charge of sales.

■

LUMINATOR-HARRISON, INC. — *Walter F. Gips, Jr.,* elected president, succeeding *Albert L. Arenberg,* now chairman of the board.

■

BUCKEYE STEEL CASTINGS CO.—*David D. Macklin* appointed chief mechanical engineer, Product Engineering Department, succeeding *Dr. James C. Settles,* deceased.

■

CAMEL SALES CO.—*W. C. Hurson* and *R. H. Schafer* elected vice-presidents.

■

AMERICAN STEEL FOUNDRIES, SUBSIDIARY OF AMSTED INDUSTRIES, INC.—*Gordon L. Kibbey,* sales agent, appointed district sales manager, Transportation Equipment division, at St. Paul, Minn., succeeding *Wallace B. Martin,* retired. *Vincent W. Swiatowski* and *Kendall L. Anderson* appointed sales agents at Baltimore, Ohio, and Philadelphia, Pa., respectively.

■

OAKITE PRODUCTS, INC.—*Walter G. Boaeuf* appointed manager, Cleveland division, succeeding *Fred H. Bruening,* retired.

Increase Wheel Life up to 300%!

With Nalco Moly Stick Flange Lubricant

Nalco "Moly Sticks", made of tough, long-lasting molybdenum disulfide, offer railroads flange lubrication which can increase wheel life as much as three or four times. These "Moly Sticks" are applied precisely where needed, with a Nalco Flange Lubricator—give wheel flanges a tough, long-lasting (up to 6000 miles per stick) dry lubrication. It won't creep or pick up brake shoe dust or sand that converts ordinary oil or grease type lubricants to abrasive mixtures. The result: Fewer wheel turnings and renewals, reduced labor and material costs.



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easy to install,

easy to maintain

Simply-designed Nalco Flange Lubricators make application of "Moly Sticks" quick and easy—a far simpler and lower-cost system than "wet" lubrication. They're easy to install, too: a diesel locomotive can be outfitted with eight lubricators in less than one man-day. After installation, Nalco Flange Lubricators can be swung out to inspect or replace "Moly Sticks" and swung back into place—without tools or special equipment.

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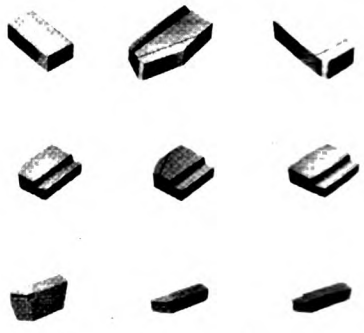
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What's New

(Continued from page 9)



Cemented Carbide Inserts and Tools

The Carboloy line of cemented carbide inserts and tools now includes the following specifically designed for use in railroad wheel and axle machining applications:

Style SWT inserts for Sellers tracer control wheel-turning lathe in two basic shapes —the SWT-40 for mushroom roughing, flange roughing, and tread and outer flange contouring, and the SWT-32 for inner flange contouring.

Styles M-1520, MH and M-0550 inserts are for use with the Niles wheel-turning lathe.

The Style WTS-10 insert, in 5/8-in. diam-

er, is for use with the Stanray wheel uing machine.

For diesel and car-wheel borers using ur-tool Type L boring bars, four insert yles are available—Style CDH insert, ound with a 6-deg taper, in three sizes, overs full range of rough boring require- ents in cast-iron and steel; Style WRC-22 sert for rough boring in cast iron; Style RS-22 with a chip-breaker for use when ugh boring steel, and the WF-22 insert r finish boring in either cast iron or steel.

Styles TA-512 and JT-10 are brazed tools r use with Sellers journal-truing and axle- rning lathes. General Electric Co.

For more information, circle 4-16 on the upon on page 46.

the same time, providing the necessary flexibility of movement. The grommet, which has a 1½-in. diameter hole, is installed in the structural members by flaring its specially designed shank back on itself. The electric cables, or tubing, are then strung through the grommets in the structures and properly tensioned. Each line is then snapped into its resilient socket in the fairlead which is pushed into the grommet. At present, the fairlead is made for No. 2 copper wire (.40 diameter). Snap-ins can be made to fit smaller sizes. Patents are pending on this assembly. Western Sky Industries.

For more information, circle 4-18 on the coupon on page 46.

Hopper-Car Finish

IFCO Elastica coating is said to improve protection to the interior and exterior of hopper cars. Asphalt and rubber synthetic resins are used in the formulation which is said to have good resistance to low temperatures, humidity, chemicals, alkalies, and other conditions injurious to metals. The coating, which is said not to chip or loosen under rough conditions, can be applied with brush or sprayed. As part of an engineered maintenance painting system, an IFCO primer is recommended, but other types of zinc dust primers and red lead iron oxide primers can be used. Industrial Finishes Co.

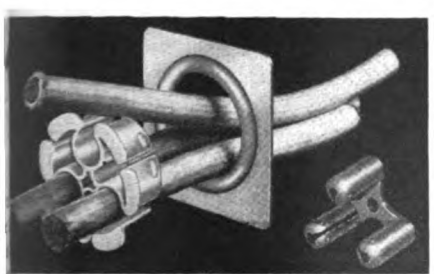
For more information, circle 4-19 on the coupon on page 46.



ompressed Air or Breathing

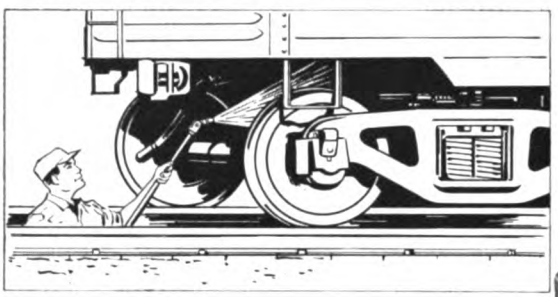
ressure-regulated air from the nearest mpressed air line, processed through a an Air-Dryer and sent into a face mask, pplies clean, dry, non-toxic air from out- de areas to workers in spray booths and in her jobs involving fumes and dust. Previ- sly, the oil from the compressor made erators "oozy." Van Products Co.

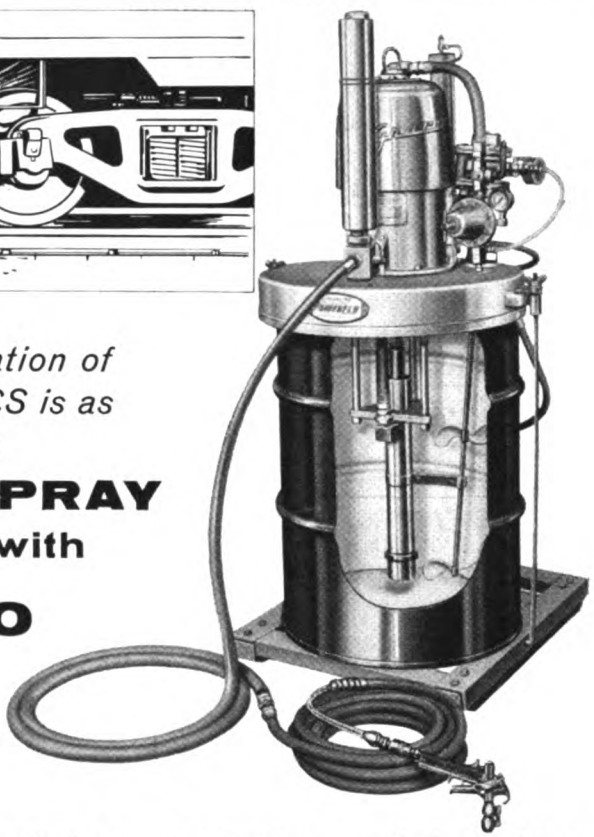
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he problem of properly supporting and sulating electrical cables and hydraulic nes in flexible structures is said to be lved through the use of three resilient olded nylon parts—a fairlead which sup- rts the cables and snaps into a one-piece ip grommet, and a lock which secures the ables or tubing in the assembly while, at





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Trade Publications

8. REFRIGERATION OIL. Requirements, selection, and properties of, and tests for evaluating, a refrigeration oil described in revised Bulletin 43. Sun Oil Co.

9. SOLID BEARING OPERATION. "Current Economics of Solid Bearing Operation in Freight Service" updates performance data, solid bearing operating cost, and comparative economics of solid vs roller bearings by same method used by AAR in Mechanical Division Report 20000. Magnus Metal Corp.

10. CEMENTED CARBIDES. Catalog No.RR-61 describes Carboloy cemented carbide inserts and tools for railroad wheel and axle machining. General Electric Co.

11. AIR BRAKE HOSE AND FITTINGS. Catalog 4486 covers Parker 861 hose and Hoze-lok-86 fittings for railroad air service. Includes hand assembly instructions and conversion chart showing Parker hose assembly and fitting part number equivalents of railroad industry numbers. Parker-Hannifin Corp.

12. ALLOY-STEEL STRUCTURAL SHAPES. Booklet ADUC 01101 gives full information on quenched and tempered alloy-steel structural shapes—wide flange sections, standard beams, channels and angles rolled from USS T-1 and T-1 type A constructional alloy steels; 9% nickel low temperature alloy steel; HY-80 naval armor shipbuilding steel, and other alloy grades. U. S. Steel Corp.

13. INSULATION SYSTEM. Booklet contains data on dielectric strength, power factor vs. temperature, heat transfer, and other properties of Neccobond and comparative insulations for high-voltage coils in motors, generators, and special research apparatus. National Electric Coil.

14. ARC WELDING ATTACHMENTS. Bulletin 5200.7 gives performance and application data on two attachments for use with Lincolnweld line of full automatic submerged arc welders. Lincoln Electric.

15. GAS-SHIELDED ARC WELDING. Wire dispensers, control units, and guns used with Miniarc, Dual Shield, Argonaut, Consumable Spot and Carbon Dioxide Steel welding processes described in Gas-Shielded Arc Welding booklet. National Cylinder Gas Div., Chemetron Corp.

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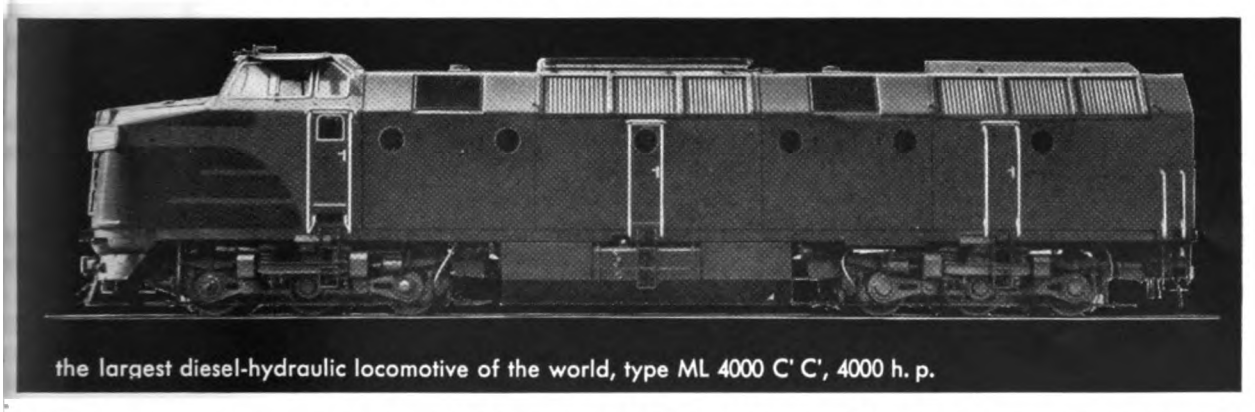
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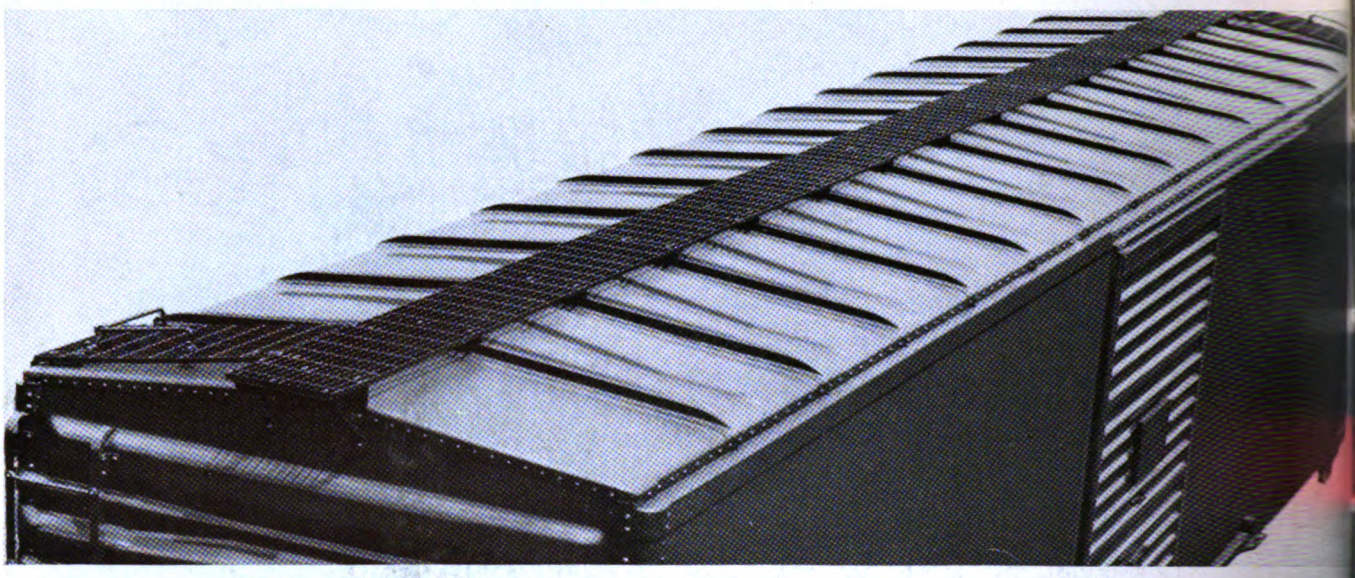
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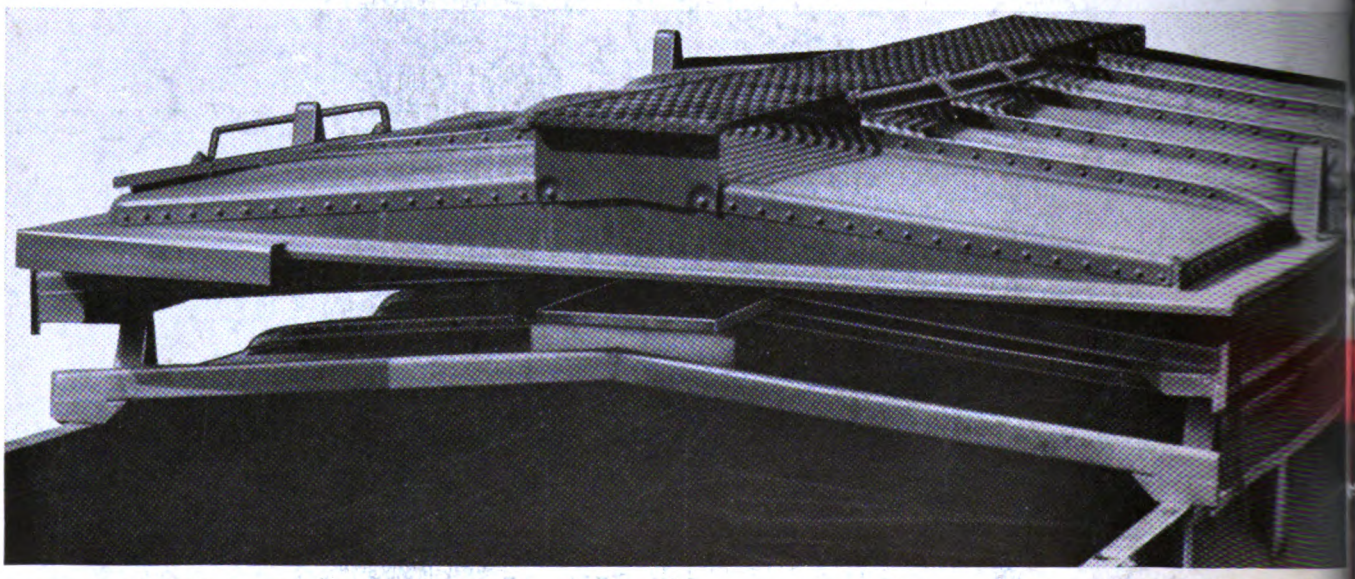
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Protection of valuable loads is complete with this removable gondola roof. Valuable lading of all types is given complete weather protection in transit. Three rigid sections can be readily removed and stored at one end of the car or on the dock while loading or unloading.

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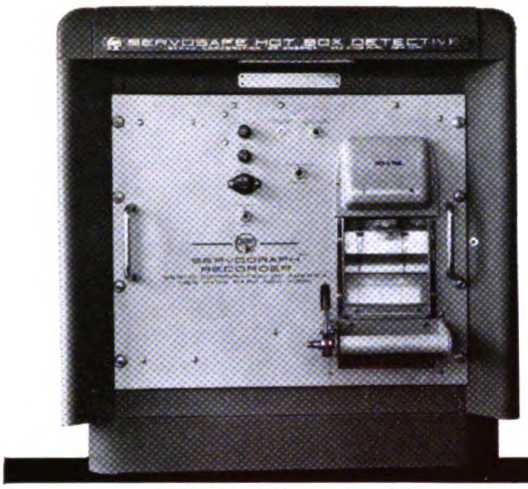
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How Boston & Maine Inspects Journal Roller Bearings

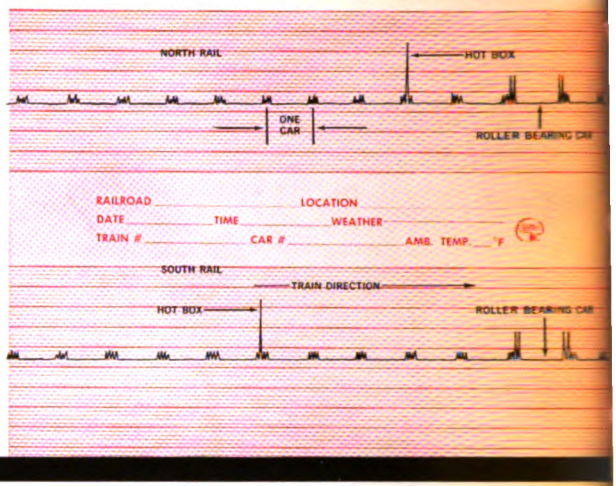
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SERVOGRAPH® Recorder Unit



SERVOGRAPH® tape record

LEARN TO LIVE WITH HOT BOXES!

Heavier loads, faster speeds, longer runs... and hot boxes continue to be a problem as old as railroading itself. No one has to tell the Mechanical Department that overheated journals are still with us, despite many recent improvements in lubricators and maintenance practices. With complete elimination of the causes of hot boxes a long way off, it's time to consider every possible means of living with them.

■ **When Is A Hot Box "Hot"?** If you consider a box to be hot only when it's lighting up the landscape around a stalled train or wreck, or when it belches smoke or burns the car inspector's hand, then the first step toward making your peace with this operating enemy-number-one is to recognize it in the "suspect" stage. Long before burn-off, and some time before the likelihood of detection by manual or visual means, faulty or improperly lubricated bearings begin to show symptomatic rises in temperature above the average for other, "normal" bearings on the same train. Devious devils, these suspects may continue undetected and undetectable for many miles or they may burst into flame before clearing the yard. The one infallible way to spot them as likely troublemakers is with an approach-to-yard SERVOSAFE® Hot Box Detective* installation.

■ **How The SERVOSAFE® Detective* System Helps You Get Your Hooks On The Real Offenders.** Located a few miles outside the approach to a yard, the infrared scanners of a SERVOSAFE® unit register comparative temperatures of every journal box on the incoming train. By the time the train arrives, your inspectors and maintenance men are equipped with the evidence to stage their own "lineup" of suspicious characters, based on the assurance of 100% uniform inspection of every journal before a single lid is opened.

■ **How "Efficient" Is The SERVOSAFE® Hot Box Detective System?** "Efficiency, I believe," says Bob McKnight, Editor of *Railway Signaling & Communications*, "is a misnomer when applied to hotbox detectors... it usually means the ratio of hotboxes found to the number indicated hot by the detector. This is misleading because people interpret a high numerical value for this ratio to mean that the device is *efficient*, hence a very good thing. If this ratio is low, people discredit the device and its use.

"What throws efficiency out of kilter is the ratio numerator—*hotboxes found.* The cause is the time lag that naturally occurs between the time the detector spots a hotbox until the train is stopped and the overheated journal found by a trainman or a car inspector. This time delay is sufficient in many cases to allow for proper cooling of a journal so that no hotbox is found... this should not condemn the detector. It did its job properly, but the fact that a man can't lift a journal box lid on a moving train necessitates the time delay."†

When properly judged as a ratio of the number of accurate indications recorded to the total number of journals scanned, efficiency of the Hot Box Detective approaches 100%.

■ **Selective Maintenance And How It Pays Off.** Tests with approach-to-yard SERVOSAFE® Detective installations prove that the number of set-outs for journal box maintenance can be drastically and safely reduced by limiting attention to those bearings shown by the instrument to be operating at temperatures above normal for the train. One road reported a reduction of 12:1 in set-outs following SERVOSAFE® installation and the adoption of this maintenance practice. Savings in inspection-time delay are obvious. Down-the-line savings—elimination of train stoppages, burnouts, and derailments—are even more dramatic. For example, one major road reporting 266 hot boxes found in 12 months of SERVOSAFE® operation, stated that 174 of them *could not have been detected by visual or manual inspection!* Yard inspection efficiency (as measured by reduced operating costs and increased car availability) invariably goes up when yard operations are forewarned by the SERVOSAFE® Hot Box Detective of overheated journal locations.

■ **Living With The Problem.** Improved equipment and heads-up maintenance have done much to offset the mechanical causes of journal failure, aggravated by increasingly difficult operating conditions. Successes in these areas are commendable and are being pressed to the limit by Engineering and Mechanical Departments. Yet only recently, for the first time since dieselization and the long fast train, has a really major assault in preventive maintenance become available with perfection of the SERVOSAFE® Infrared Hot Box Detective System. Integrated with yard inspection programs, this device is making it possible to live with the hot box problem. The number of such installations has grown rapidly, even during periods of retrenchment, to a present total of over 350 on 28 major Class I roads.

SERVOSAFE® Hot Box Specialists are available for immediate consultation. Get with them soon, marshal your figures, and start pushing for a real breakthrough in hot box cost reduction.

†*Railway Signaling & Communications*, October, 1961

Railroad Products Division

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111 New South Road
Hicksville, L. I., N. Y.

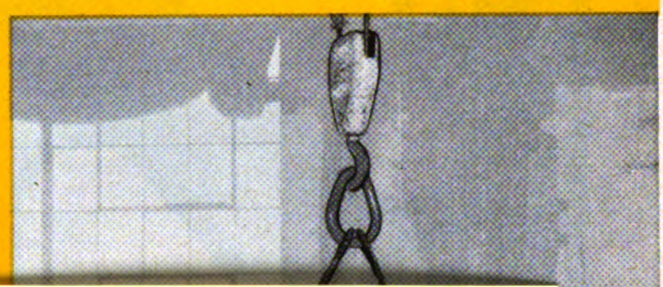
*Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.

UNIQUE YELLOW STRAND COMBINATION WHEEL SLING MOVES WHEELS OR ASSEMBLIES SWIFTLY, EASILY, SAFELY!



Close-up shows specially designed Yellow Strand hook. It clasps or unclasps easily and cannot slip during lift. Fits all wheels.







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309 Sp Above rates apply only to railroad men in U. S. & possessions, Canada & Mexico

Sling in operation in the yard. Only one wheel is shown, but two are carried as easily. Sling holds wheels straight and true making it easy to slip wheels on axle.

In the wheel shop the Yellow Strand sling lifts wh with little effort on the part of the worker. Assembly ca ered quickly and easily. Hooks cannot slip.

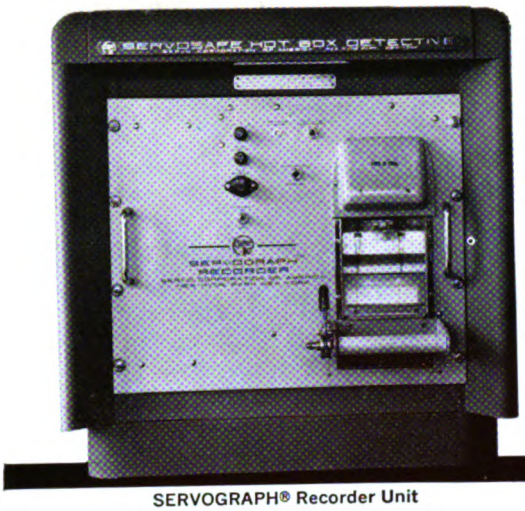
Here's another example of the kind of service and satisfaction you can expect when you call on the Yellow Strand sling experts for help or advice. Perhaps this sling can help you do a job better or faster. Perhaps your problem needs solution. Whatever that problem may on Yellow Strand Braided Safety Slings t Call your Yellow Strand man for full info

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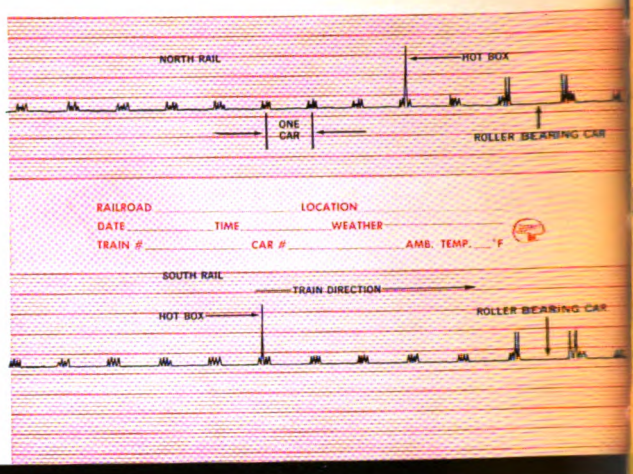
BRAIDED SAFETY SLINGS

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SERVOGRAPH® Recorder Unit



SERVOGRAPH® tape record

LEARN TO LIVE WITH HOT BOXES!

Heavier loads, faster speeds, longer runs . . . and hot boxes continue to be a problem as old as railroading itself. No one has to tell the Mechanical Department that overheated journals are still with us, despite many recent improvements in lubricators and maintenance practices. With complete elimination of the causes of hot boxes a long way off, it's time to consider every possible means of living with them.

■ **When Is A Hot Box "Hot"?** If you consider a lighting stalled t belches sr tor's han making y enemy-nu the "susp off, and s of detecti faulty or ings begi in temper other, "n train. De may cont able for r into flame one infall troublem to-yard sı installati

■ **How T System On The** miles o the inf unit re of eve train. your i are eq their acters unifo befor

■ **Ho Hot e System?** I be of *R tion* hotl rat

nners of a SERVOSAFE® parative temperatures box on the incoming me the train arrives, nd maintenance men the evidence to stage " of suspicious char- he assurance of 100% ion of every journal l is opened.

" Is The SERVOSAFE® e System? "Efficiency, Bob McKnight, Editor *aling & Communica-* omer when applied to ...it usually means the s found to the number indicated hot by the detector. This is stated that 174 of them *could not have*

SERVOSAFE® Detective installations prove that the number of set-outs for journal box maintenance can be drastically and safely reduced by limiting attention to those bearings shown by the instrument to be operating at temperatures above normal for the train. One road reported a reduction of 12:1 in set-outs following SERVOSAFE® installation and the adoption of this maintenance practice. Savings in inspection-time delay are obvious. Down-the-line savings—elimination of train stoppages, burnouts, and derailments—are even more dramatic. For example, one major road reporting 266 hot boxes found in 12 months of SERVOSAFE® operation, rapidly, even during periods of retrenchment, to a present total of over 350 on 28 major Class I roads.

SERVOSAFE® Hot Box Specialists are available for immediate consultation. Get with them soon, marshal your figures, and start pushing for a real breakthrough in hot box cost reduction.

†*Railway Signaling & Communications*, October, 196

Railroad Products Division

SERVO CORPORATION OF AMERICA

111 New South Road
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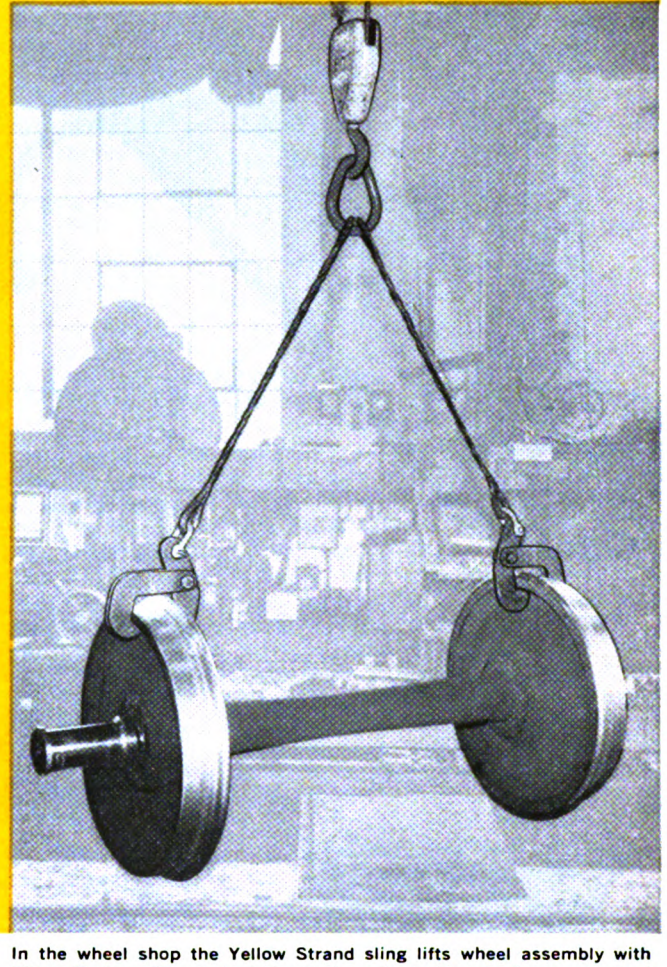
UNIQUE YELLOW STRAND COMBINATION WHEEL SLING MOVES WHEELS OR ASSEMBLIES SWIFTLY, EASILY, SAFELY!



Close-up shows specially designed Yellow Strand hook. It clasps or unclasps easily and cannot slip during lift. Fits all wheels.



Sling in operation in the yard. Only one wheel is shown, but two are carried as easily. Sling holds wheels straight and true making it easy to slip wheels on axle.



In the wheel shop the Yellow Strand sling lifts wheel assembly with little effort on the part of the worker. Assembly can be maneuvered quickly and easily. Hooks cannot slip.

Here's another example of the kind of service and satisfaction you can expect when you call on the Yellow Strand sling experts for help or advice. Perhaps this sling can help you do a job better or faster. Perhaps your problem needs a different solution. Whatever that problem may be, depend on Yellow Strand Braided Safety Slings to solve it. Call your Yellow Strand man for full information.

Yellow Strand®



BRAIDED SAFETY SLINGS

BRODERICK & BASCOM ROPE CO.

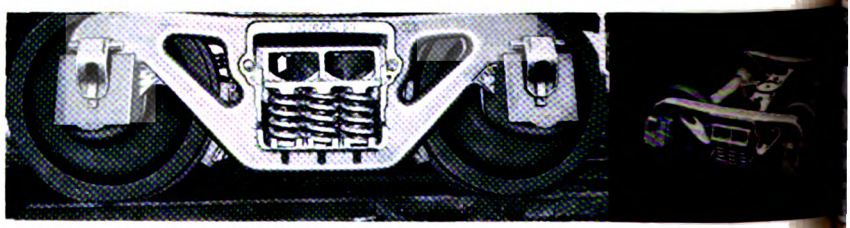
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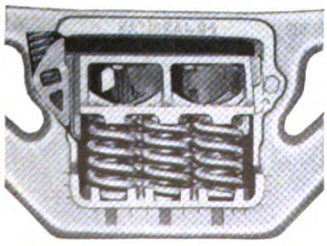
NEW 6½ X 12 HEAVY DUTY
NATIONAL C-1 TRUCK



feature stronger tension members and pedestal jaws

Color overlays show strengthened areas. Strengthening has been accomplished by redistributing metal so that over-all frame weight remains unchanged. New tension member design*, of inverted "U" section at lower part and conventional "U" at upper part, reduces stresses 28% at lower part and 20% in upper part compared with conventional sections of same size. More even stress distribution throughout whole frame is feature of new design. *Patented





Service-Proven C-1 Snubbing Mechanism Gives Smoothest Ride at Lowest Maintenance

The new 6½ x 12 truck is the top of the C-1 Truck line — the most desirable heavy freight truck in production. Through a scientific approach to the problem of ... redistribution, it has greater strength without any increase in over-all frame weight ... an even stress distribution that shrugs off high impact forces.

Equally important, the 6½ x 12 C-1 shares with other trucks in the National family — the 5 x 9, 5½ x 10, and 6 x 11 — the exclusive C-1 design vertical snubbing mechanism — the only friction snubbing mechanism service-proven to ... been right — right from the start.

No matter which National Truck you specify, you get all these important C-1 ... advantages: Smooth ride . . . longer wear life . . . proven maintenance economy of ... 5 cents per C-1 Truck in service over a 14-year period. *Or, to put it another way, one-third of a cent per C-1 Truck per year for maintenance!*

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REPORT FOR MAY

P-S Sees "Rebirth" For Lightweight Cars

A "rebirth" for lightweight rail passenger vehicles, particularly for urban and suburban transportation, is predicted by Pullman-Standard. Because of the emphasis which transit engineers are now placing on lightweight rolling stock, and because of its experience in building all-welded freight and passenger cars in steel and aluminum, P-S is currently exploring the design of a lightweight welded aluminum transit car. This design program was outlined by J. W. Borger, assistant vice president, engineering, Pullman-Standard, for the Railway Conference sponsored by three engineering societies in Toronto, Ont., last month.

"Metropolitan Transportation" was the theme of the two-day session conducted by the American Society of Mechanical Engineers, American Institute of Electrical Engineers, and the Engineering Institute of Canada. Mr. Borger indicated that the P-S transit car involves a basically tubular design in place of the conventional "box-type" structure. This "more efficient" arrangement could produce weight savings of 60 to 70 lb per ft over the lightest cars now in service, and would be fully compatible with the most modern propulsion, braking, and suspension systems. Utilizing conventional four-wheel trucks, it has been calculated that a 74-ft car-body represents a realistic length for the unitized structure proposed. This assumes that "the longest possible car will be the lightest per unit of length because the ratio of truck weight to length is lowest, "Mr. Borger explained. Making full use of a stressed-skin construction with curved sides and with the roof designed to be a load carrying member, a weight of 800 lb per ft can be achieved even with a long car having a high design bending moment.

Tests with a New Haven multiple-unit coach equipped with silicon rectifiers in place of the original ignitron rectifiers have shown these solid state devices to be feasible in traction propulsion power service. Two General Electric engineers reported that the car has now been in actual service for a year, and that prior to road testing it was subjected to a variety of tests on the GE test track at Erie, Pa. The car takes its power from the New Haven 11,000-volt a-c catenary and the rectifiers deliver 600-volt d-c for the traction motors. "Silicon rectifiers will be serviceable for railway operation and should give long life with a high degree of dependability," they concluded.

The feasibility of automatic freight train operation was proved by the successful tests made on a 10-mile section of the Canadian National near London, Ont., in 1960 (RL&C, Nov. 1961, p 21). R. G. McAndrew, control engineer, General Railway Signal, reported that analysis of this operation showed major problems to be: (1) development of a mathematical representation of the train and its controls so that response and stability characteristics may be examined; (2) choice of a parameter for the control; (3) suitable control at very low speeds; (4) train handling without damage to cars or lading; (5) vibration effects on locomotive-carried equipment.

"Present day control design techniques are applicable to train automation," Mr. McAndrew said. One control approach is a closed-loop system where the difference between demand and actual train speed provides actuation to a control, the output of which is applied to the locomotive. The output of the locomotive is applied to the train, the output of which is the controlled variable—speed. The "loop" is closed by unity feedback of velocity to the system input where it is compared to the desired speed. The advantage of "closing the loop" lies in the fact that many undesired disturbances can be handled satisfactorily with little loss in inherent accuracy of the control system.

(Continued on page 38)

TIME SAVING IDEAS FOR MAY

Milwaukee Gets 100,000th PS-1 Box Car 15
Rubber Suspension Cuts Traction Motor Impacts 18
Ore Pellets Handled in Reading 85-Ton Hoppers 25
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Personal Mention 41
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A year's supply of fuel oil filters!

(with Electro-Motive's Improved Filtration Systems)

Now, with as few as four changeouts a year, new Electro-Motive filters will clean up the fuel oil and insure constant pressure delivery from fuel tank to injectors.

Designed to reduce maintenance costs on General Motors' Revolutionary GP-30, these three new concept filters will give *new life* and *unprecedented filtering efficiency* to the fuel filtration system on your older model locomotives. Only minor system modifications are needed.

Each new filter plays its own specialized role in a program of staged filtration. Abrasive, gum and wax particles that could damage fuel pump mechanism or cause injector malfunction, are removed from the fuel to an increasingly finer degree with each filtering step.

These greater capacity filter elements mean changeouts take place *less frequently*, and new housing modifications mean changeouts are *easier to make.* Open filter housings quickly with a handwheel—no tools are needed.

Here's Electro-Motive's three-step, reduced maintenance/improved filtration plan for GP and SD model fuel systems:

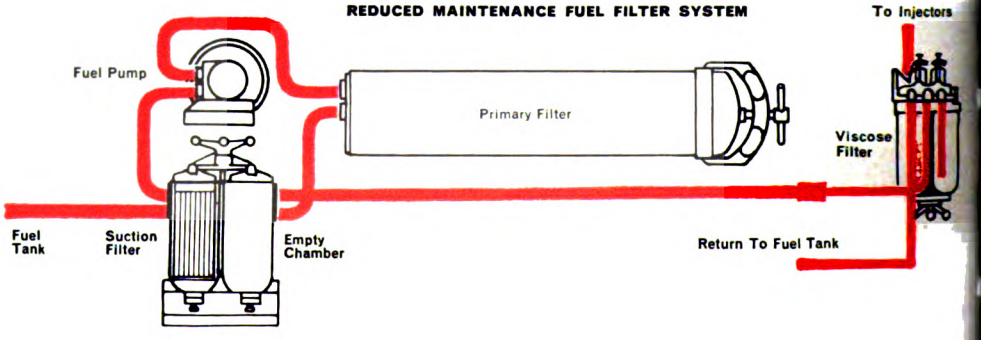
1. New Suction Filter. Use present dual housing with *new monel metal, pleated strainer element* on the suction side of the fuel pump. Leave cartridge chamber on the pressure side empty.

2. New Primary Filter. Add a new housing and a *new cageless sock type element* with a small amount of additional piping.

3. Engine Mounted Conversion Kit. Retain upper part of engine mounted housing containing two fuel sight glasses. Replace lower part of housing with new parts designed to contain two *new, viscose, honeycomb elements.*

The sketch at right shows Electro-Motive's new, longer life filter elements at work in a modified GP or SD model fuel oil filtration system. The same filters may be used on all General Motors Locomotives with similar system modifications.

See your Electro-Motive Sales Representative or write to Electro-Motive Division, La Grange, Ill. for additional information.

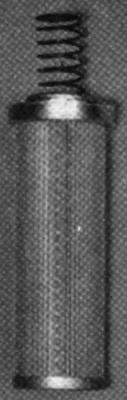


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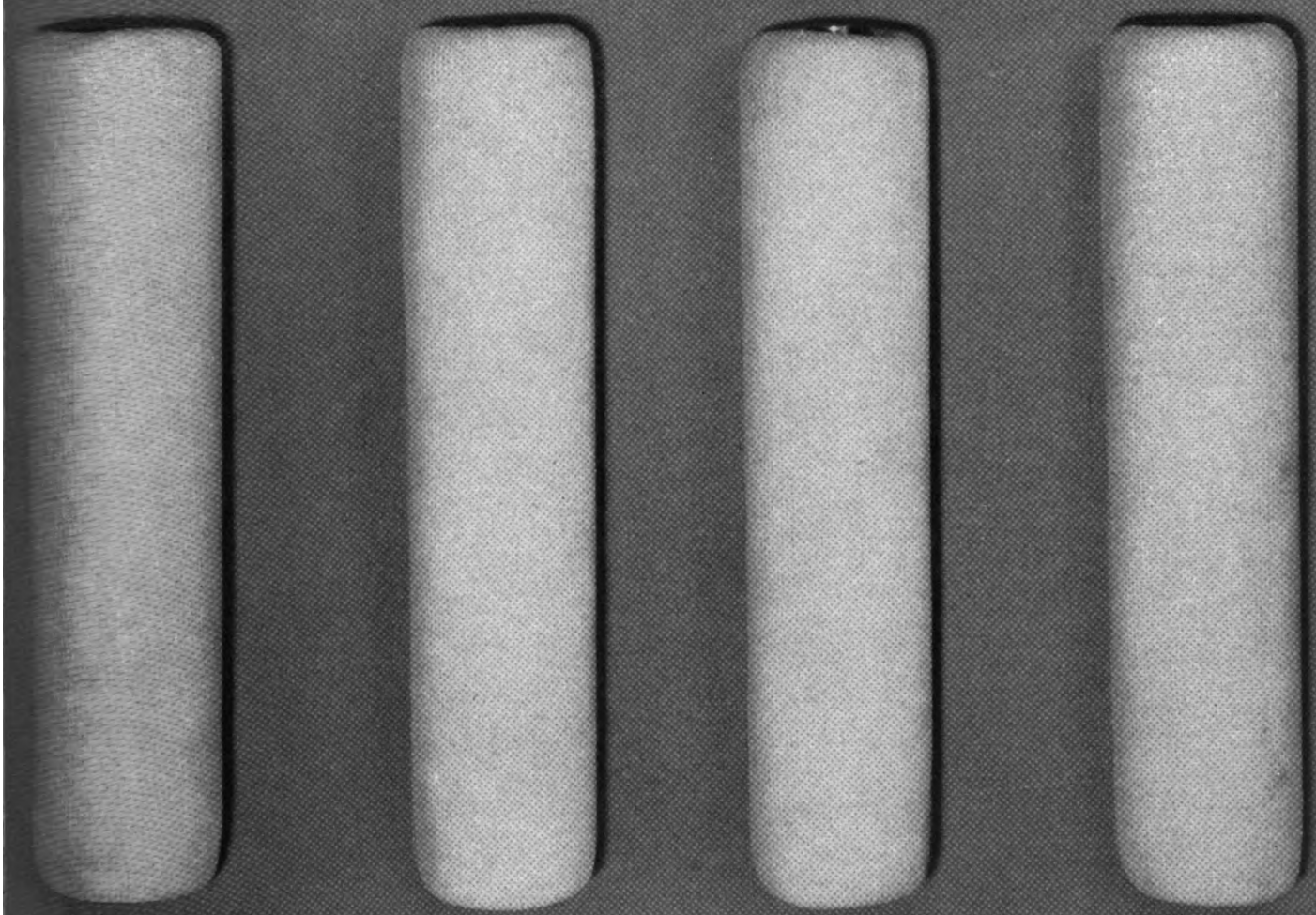
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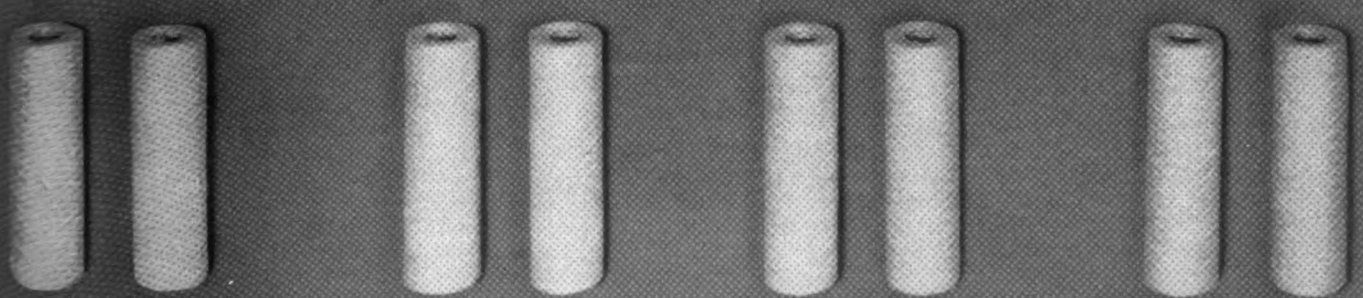
In Canada: General Motors Diesel, Limited, London, Ontario



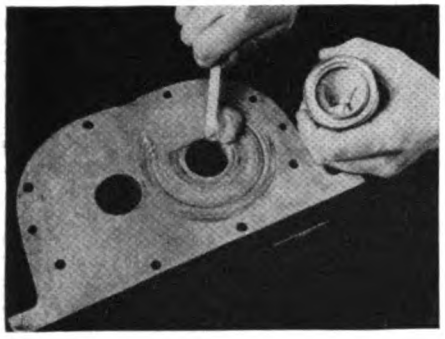
1. **NEW SUCTION FILTER STRAINER**—PLEATED MONEL METAL —CLEAN AND RE-USE



2. **NEW PRIMARY FILTER**—HIGH CAPACITY, CAGELESS, SOCK TYPE—THROW AWAY AT CHANGEOUT



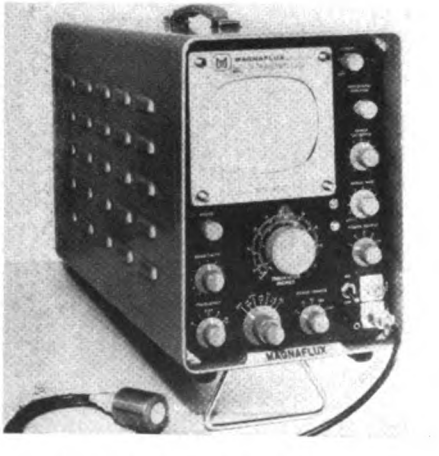
3. **NEW ENGINE MOUNTED FILTER**—VISCOSE HONEYCOMB TYPE—THROW AWAY AT CHANGEOUT



Structural Adhesive for Repairing Blower Castings

Costs to repair worn and scored surfaces of blower end castings, it is said, have been substantially reduced through the use of EC-2086, a one-part modified epoxy resin, on PFE refrigerator car refrigeration units. In repairing, worn castings are degreased and then etched with phosphoric acid and alcohol to remove all grease and dirt. The adhesive is then applied over the worn area with a spatula, and the casting placed in an oven at 350 deg F for one hour. After curing, the casting is cooled and the repaired surface machined to finish dimensions. The adhesive bonds to the casting with shear strengths in the range of 5,000 to 6,000 psi at room temperatures. Minnesota Mining & Manufacturing Co.

For more information, circle 5-1 on coupon following page 42.



Internal Flaw Detector

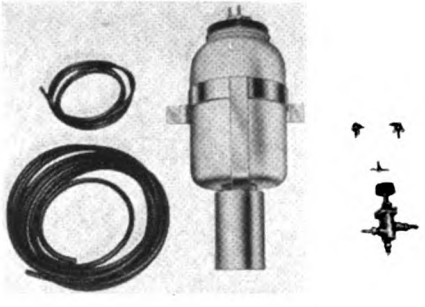
For flaw detection, six frequency ranges from 0.5 to 15 megacycles, with video presentation on 5-in. cathode ray tube, are provided by the Magnaflux pulse ultrasonic PS-800. The unit uses longitudinal wave, shear wave, through transmission, or surface wave ultrasonic methods, with contact or immersion techniques. It weighs 43 lb and operates from 115-volt, 60-cycle, single-phase current. A built-in thickness meter, internally calibrated for steel, cast iron, and aluminum, gives direct readings of wall thickness from .160 to 2.5 in. Greater thicknesses can be measured by using harmonics. Magnaflux Corp.

For more information, circle 5-2 on coupon following page 42.

Lubricant Coating

Molykote M-8800, developed after extensive laboratory tests in boundary lubrication, is an air-dry bonded solid film lubricant which is said to have many times the wear life of previous bonded coatings. The lubricant can be applied to any clean material, including metals, rubber, and plastics, without surface pretreatment. It lubricates at bearing pressures up to 100,000 psi and may be used at temperatures from minus 100 to plus 400 deg. F. Alpha-Molykote.

For more information, circle 5-3 on coupon following page 42.



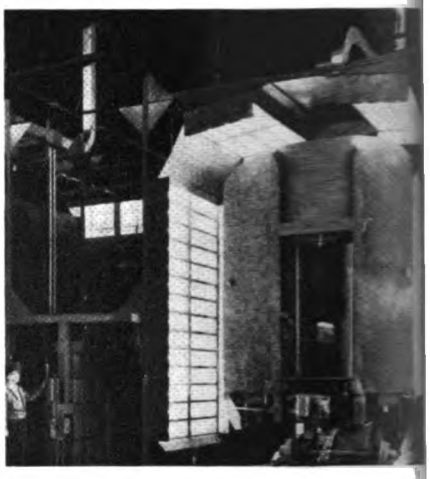
Windshield Washer

Compressed-air operation is said to produce a powerful jet stream of fluid to help the new Air-Push windshield washer remove dirt, grime, and bugs. The washer is operated by a control valve independent of windshield wipers, allowing intermittent or constant stream operation. Dry glass wiper blade abrasive/scar action is eliminated, and automatic purging of lines both before and after spray cycle eliminates freezing or clogging of lines and nozzles. Nozzles are adjustable 360 deg both vertically and horizontally. Sprague Devices, Inc.

For more information, circle 5-4 on coupon following page 42.

Infrared Drying

Ovens using 72 General Electric 3,800-watt quartz infrared lamps are being used by Pullman-Standard at Chicago for drying newly painted cars. The ovens, operated with a voltage of 480 volts, consume 3,000 watts per lamp. Lamp operation in both ovens is regulated from a central control panel. The ovens, it is said, process cars at a rate of one per hour, making it possible to paint three colors a day with excellent results. Metal temperature of the cars reaches 180 to 200 deg F as they move through the ovens at a speed of 1.5 ft per min. Primer and finish coats are dried until tack-free and hard enough to withstand masking tape. Fostoria Corp.

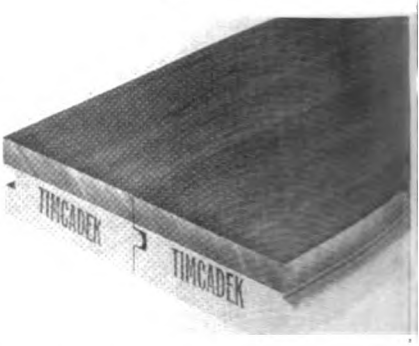


For more information, circle 5-5 on coupon following page 42.

Rust Inhibitor

A single coating of DeSoGuard, a rust inhibiting, combination primer-enamel, can be used over new or rusted steel surfaces where normal or moderately corrosive conditions exist. The coating resists temperatures up to 250 deg F and can be applied by brush, roller, or spray in film thicknesses of 2 to 4 mil. A gallon is said to cover up to 350 sq ft of surface and dry tack free in 6 hr. DeSoto Chemical Coatings, Inc.

For more information, circle 5-6 on coupon following page 42.



Car Decking

Timcadek is a car decking composed of 2-in. Douglas Fir lumber, glue laminated with a 1-in. thickness of Apitong Philippine hardwood. Bonded with waterproof glues, the glue line is said to be stronger than the wood, and the laminated pieces as cohesive as solid lumber. After lamination, the deck-

ng is run to a standard AAR 2¾ x 6 in. lecking pattern and surfaced both front and ack. Weight is less than hardwood deck- ng of comparable thickness, saving about 00 lb of dead weight per freight car. The Jnion Pacific is now receiving the first rder of Timcadek for use in 25 insulated ox cars now under construction. The order ncludes 3,000 pieces cut to exact length. Timber Structures, Inc.

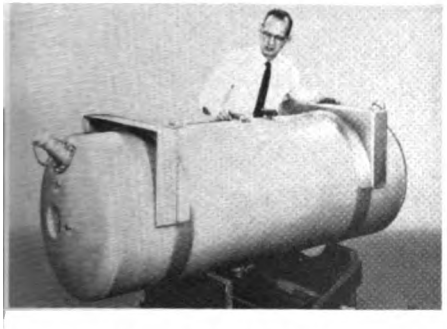
For more information, circle 5-7 on coupon following page 42.



Steam Cleaning Machine

The Fleximatic Remote Control steam cleaning gun is a future of the Model 300 Clayton Clean-Master designed for heavy equipment maintenance shops. Its squeeze grip control permits a modulated solution discharge, either from one or two guns, at rates from 300 down to 60 gph. A fully enclosed flame and electric ignition eliminates the fire hazard of an open combustion chamber and, in case of water failure, a ring thermostat immediately shuts down the burner. Gas or oil-fired stationary models are available, as well as portable and trailer-mounted oil-fired units. Clayton Mfg. Co.

For more information, circle 5-8 on coupon following page 42.



Fibre-Glass Fuel Tanks

Translucent fibre-glass diesel fuel tanks, centrifugally molded, are designed for maintenance-free service on mechanical refrigerator cars and piggyback trailers. They are said to be up to 66% lighter than metal tanks, corrosion free, and unaffected by temperature extremes. They are non-conductive and fire retardant and meet ICC specifications. Apex Fibre-Glass Products Div.

For more information, circle 5-9 on coupon following page 42.



Plastic Jacket

A non-corrosive plastic jacket has been applied to an experimental 10,000-gal insulated tank car now in service carrying caustic soda. The jacket is similar to the standard steel type, but is said to be 6,000 lb lighter. It is $\frac{3}{16}$ in. thick, and the lapped seams are joined by an adhesive and rivets. Six inches of fiberglass insulation was applied to the inside of the jacket and the tank lined for caustic service. Jackets for the heads and dome of the car are ¼ to $\frac{5}{16}$ in. thick and are also joined by adhesive and riveted to the main jacket. The jacket was molded and fabricated from Hetron polyester resin. Hooker Chemical Corp.

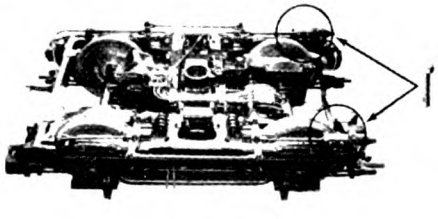
For more information, circle 5-10 on coupon following page 42.



Air Drill

Normal operating speed of 2,600 rpm no load at 90 psi can be adjusted on the Sioux No. 1450 ¼-in. air drill with a built-in speed control for adaptation to any job. The drill develops a full 1/3 hp. and weighs only 2 lb 4 oz. The unit meets Federal specification 00-D-691 for type I, Class C, and MIL-D-4127 specification for type I, Class 1. Albertson & Co.

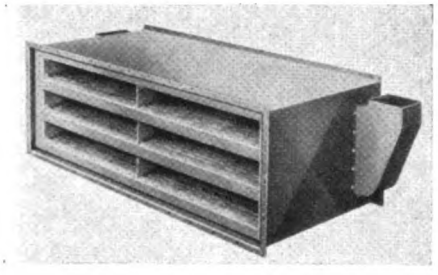
For more information, circle 5-11 on coupon following page 42.



Self-Locking Bolts

To prevent fastener loosening due to continuous shock, vibration, and other severe running conditions, latest New York City subway cars, have self-locking Nylok ¾ x 4⅛ hex head bolts, instead of ordinary studs, fastening brake-slack adjusters to truck frames. A nylon pellet imbedded in the threaded section of the fastener compresses upon installation, creating a metal-to-metal engagement of the opposing threads. This patented locking action, it is said, is sustained and increased as the pellet, trying to regain its original shape, tends to "grow" into the threads. Nylok Corp.

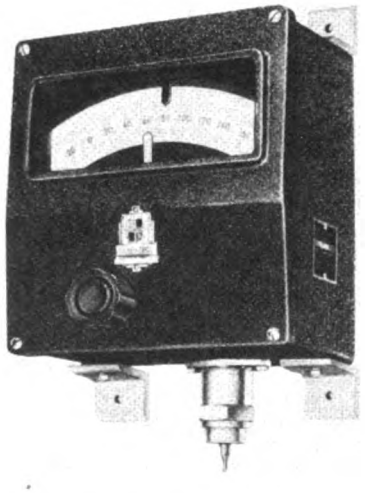
For more information, circle 5-12 on coupon following page 42.



Self-Cleaning Air Filter

Large volumes of air, it is said, are handled by the DynaVane at high velocity with minimum pressure drop. The cleaner is essentially an inertial separator made up of one or more wedge-shaped cells. It is designed to supply clean air for gas turbines and ventilating and cooling systems on locomotives, and operates under conditions of high dust concentration at any temperatures. Farr Co.

For more information, circle 5-13 on coupon following page 42.

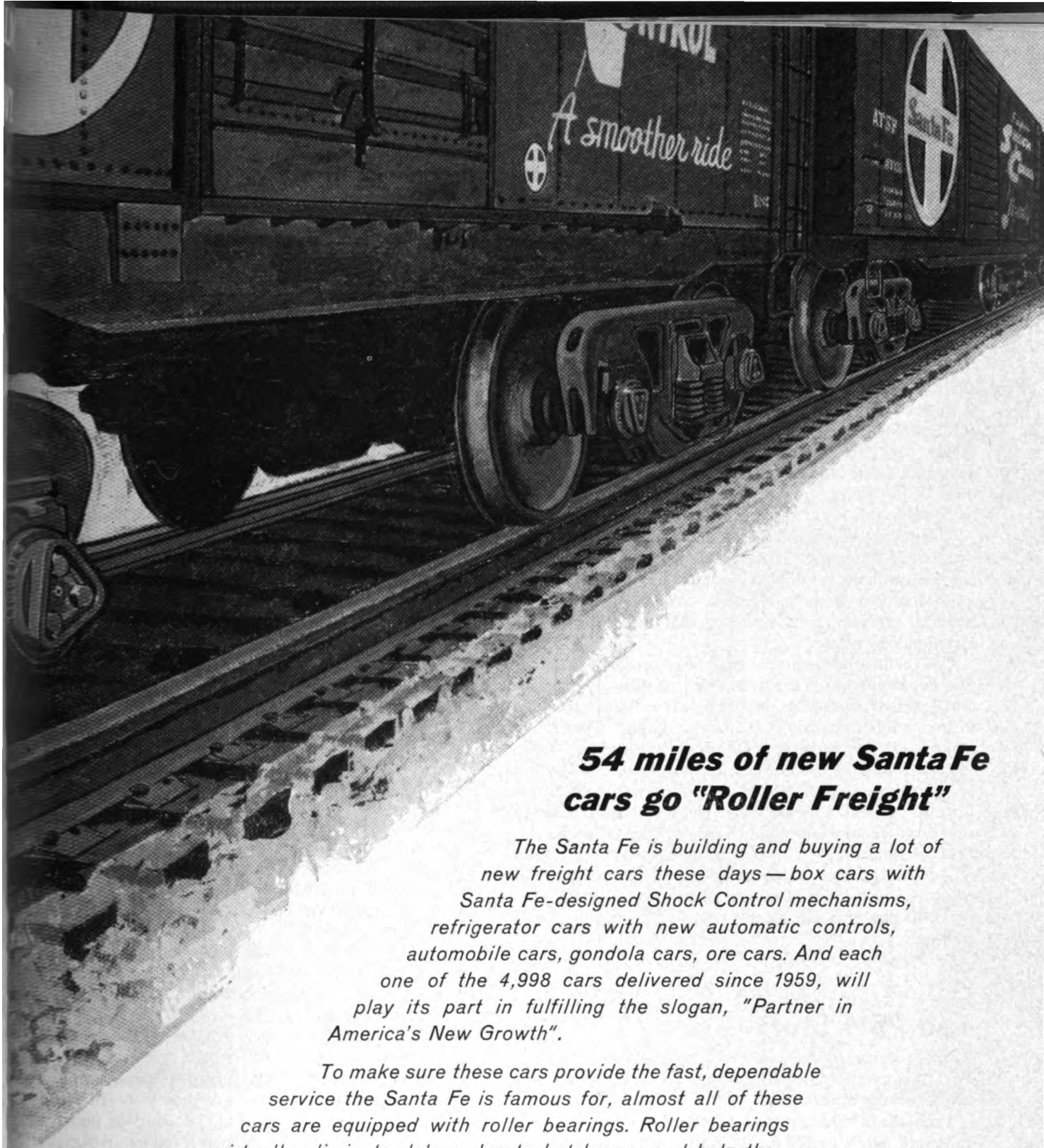


Electrical Thermostat

The Model DW electro-mechanical indicating device has been specified as the temperature control on 150 of the latest FGE order for 40-ft piggyback vans with underslung refrigeration units. The control, developed for piggyback and container markets, features a high visibility scale and two auxiliary switches which are used to change the cooling-heating cycles when switching from perishable to frozen food service. Overall dial range is —30 to 170-deg. Partlow Corp.

For more information circle 5-14 on coupon following page 42.


LD.LMT. 13430
LT.WT. 7570
54
M.



54 miles of new Santa Fe cars go "Roller Freight"

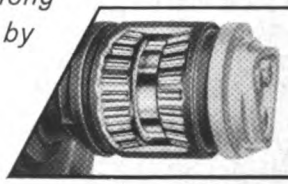
The Santa Fe is building and buying a lot of new freight cars these days — box cars with Santa Fe-designed Shock Control mechanisms, refrigerator cars with new automatic controls, automobile cars, gondola cars, ore cars. And each one of the 4,998 cars delivered since 1959, will play its part in fulfilling the slogan, "Partner in America's New Growth".

To make sure these cars provide the fast, dependable service the Santa Fe is famous for, almost all of these cars are equipped with roller bearings. Roller bearings virtually eliminate delays due to hot boxes, and help the Santa Fe get maximum return on their new car investment.

More and more railroads are switching to "Roller Freight", and showing a marked preference for Timken® "AP" heavy-duty bearings as well. (The Santa Fe has 4,064 Timken bearing-equipped cars right now.) Timken bearings are pre-lubricated and sealed to cut lubricant cost and allow fast terminal inspection. They're precision built from fine nickel-rich steel to give extra long life. And they roll millions of car miles between set-outs caused by overheated bearings.

For trouble-free operation, switch to "Roller Freight" on Timken bearings. The Timken Roller Bearing Company, Canton 6, Ohio.

Quality turns on



HEAVY DUTY TIMKEN® TAPERED ROLLER BEARINGS

EDITORIALS

Cost Control

Mechanical departments are going to hear more and more about cost control in the future. It has always been an important management function but one difficult to apply to railroad operations spread over hundreds or thousands of miles of trackage. By the time costs were known, it was usually too late to control them. Now, with electronic data processing equipment and improved communications, it is possible to put today's costs on the desks of responsible officers tomorrow morning.

This means that decisions can be made about expenditures while funds are being expended. Such a procedure contrasts with the traditional post mortems held over funds long after they have been spent. With today's railroad financial position, it is important that rigid cost control techniques be applied.

Cost control, of course, embraces more than an accurate determination of costs and their distribution to specific work or equipment programs. It gets into the field of industrial engineering. It involves human factors, job analysis, work standards, methods and procedures, tools, materials handling, and shop layouts.

This whole subject of cost control may complicate the lives of mechanical department men now hard-pressed in supervising equipment maintenance operations under difficult circumstances. But it is a subject which they must understand because the maintenance of equipment costs to be controlled are high—an average of over $1,700,000,000 per year during the past five years on Class I railroads.

The PS-1 Story

There are some aspects to the story of Pullman-Standard's PS-1 box car, as reported on page 15 of this issue, that are especially noteworthy.

First, the fact that Pullman-Standard was able to change railroads' habits by getting them to accept a standardized design was a distinct achievement. In accomplishing this feat, the cost reduction benefits inherent in mass production methods were undoubtedly a major factor in swaying individual roads away from tailor-made tastes.

Second, standardization has always been associated with stifling development and improvement of a product. Yet, during the 15 years since the first PS-1 box car was produced, over 300 changes were made in the design. These modifications were made without loss of the standardization principle and show that progress can be made without sacrificing assembly-line techniques.

Third, and perhaps most important of all, the differences between the first and 100,000th PS-1 cars are significant. Physically, the 15-year-old first PS-1 is a good car. Yet, developments have wreathed it with an aura of obsolescence. Unlike the 100,000th car, it has neither the built-in improvements required to meet today's traffic needs nor the design features essential to the financial health of the railroads. It lacks the tonnage capacity, wide doors, high shock-absorbing gear, load retainers, and the many other technological advances that identify 1962 models. It is an excellent example of why the railroads should be permitted to depreciate rolling stock at an accelerated rate.

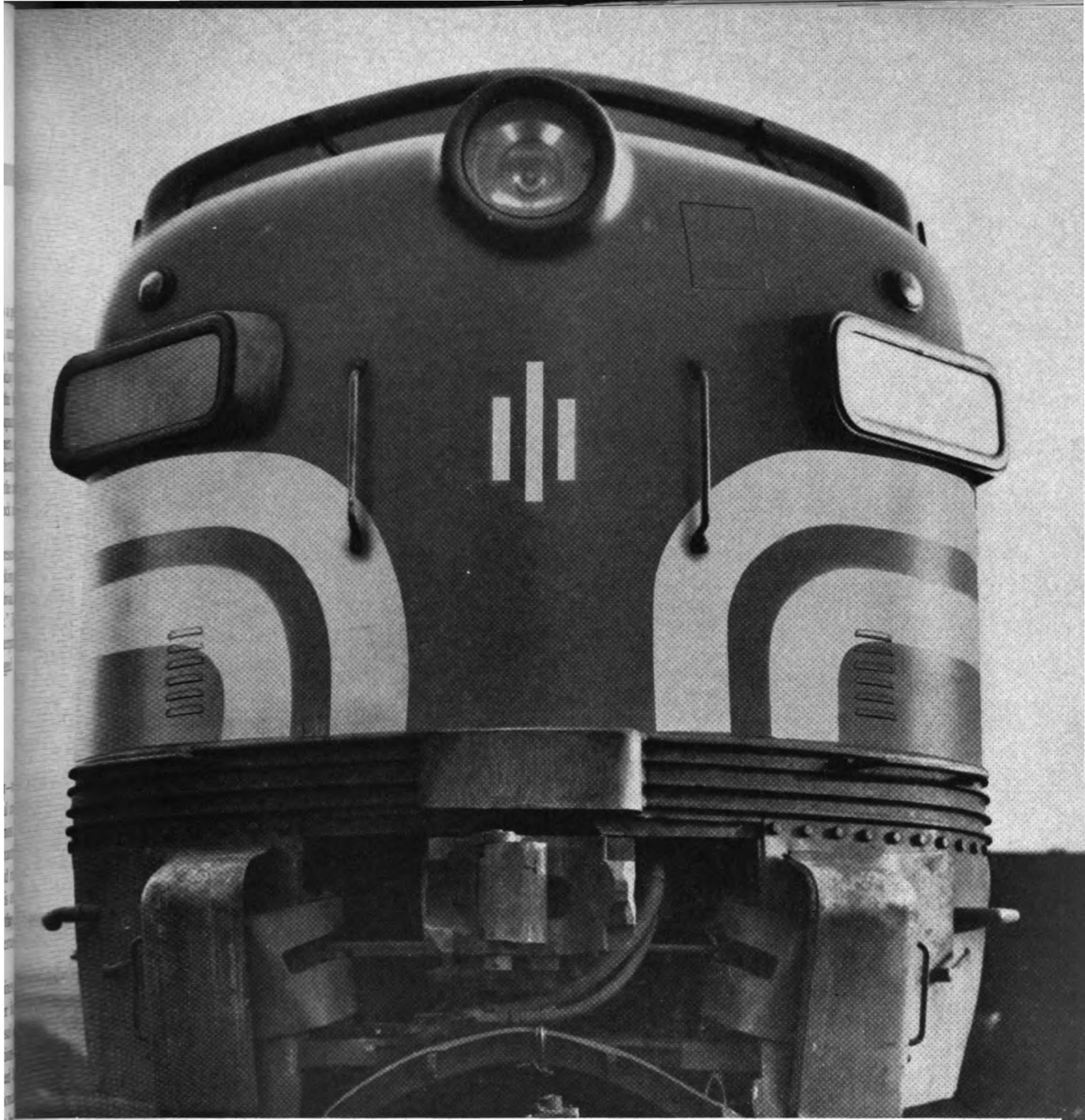
Railroad spokesmen have characterized present depreciation rates "unrealistic." Railroads are seeking a maximum depreciation rate of 15 years for railroad cars as compared to the present 25-year "service life." The comparison of the old PS-1 with its 1962 counterpart shows why the antiquated tax rules should be changed.

Another Competitor

The diesel locomotive has another competitor—not a competitor as a locomotive but another potential competitor for the distillate fraction which makes the most satisfactory locomotive fuel oil. One of the major manufacturers has announced plans to build an unspecified number of gas-turbine automobiles for sale this year. It is anticipated that more will be produced in 1963 and, if they are successful, the other auto builders will almost certainly enter the gas-turbine field.

What will this mean? Automobile gas turbines can burn kerosene, diesel oil, or practically any other liquid fuel. From a practical standpoint, this means diesel oil. If the auto gas turbine has the high-power, vibration-free, and trouble-free characteristics which are claimed for it, the fuel economy would not need to be exceptional for it to become extremely popular. If this proves to be the case, it could mean that, in a few years, practically all domestic land and air transportation would be using the same range of fuels. Over-the-road truckers are well along in converting their fleets from gasoline-powered Otto cycle prime movers to diesel. All airlines apparently aim to replace all their gasoline-driven propellor aircraft with turbine or turbo-prop planes which burn fuels similar to those used by diesel locomotives. If the automobile owner enters this same market, it could have an effect on prices paid for locomotive fuel.

It is fortunate that locomotive diesels have shown the ability to burn fuel grades somewhat poorer than those which were originally rated as satisfactory for them. Work in the utilization of the so-called "economy" fuels on locomotives may receive new impetus if the automobile gas turbine becomes popular.



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...that's why 46% of U.S. Class I railroads use Texaco Dieseltex HD

When 46% of all Class I roads specify *one* brand of diesel engine lubricant, there has to be a good reason. And here it is: Texaco Dieseltex is specifically designed to prevent power-robbing sludge. It's fortified with detergent and dispersive additives that pick up fuel carbon, hold it in suspension so it can't sludge out, can't gum up rings, pistons, cylinders or oil passages. The engine stays clean because the oil carries engine-fouling contaminants to the oil filter and leaves them there. Result: more mileage from all engine parts, much longer intervals between overhauls, higher engine availability.

Find out more about Texaco Dieseltex HD. Contact the nearest Texaco Railway Sales District Office. There's one in Atlanta, Chicago, New York, St. Louis, St. Paul and San Francisco. Or write to Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, New York.

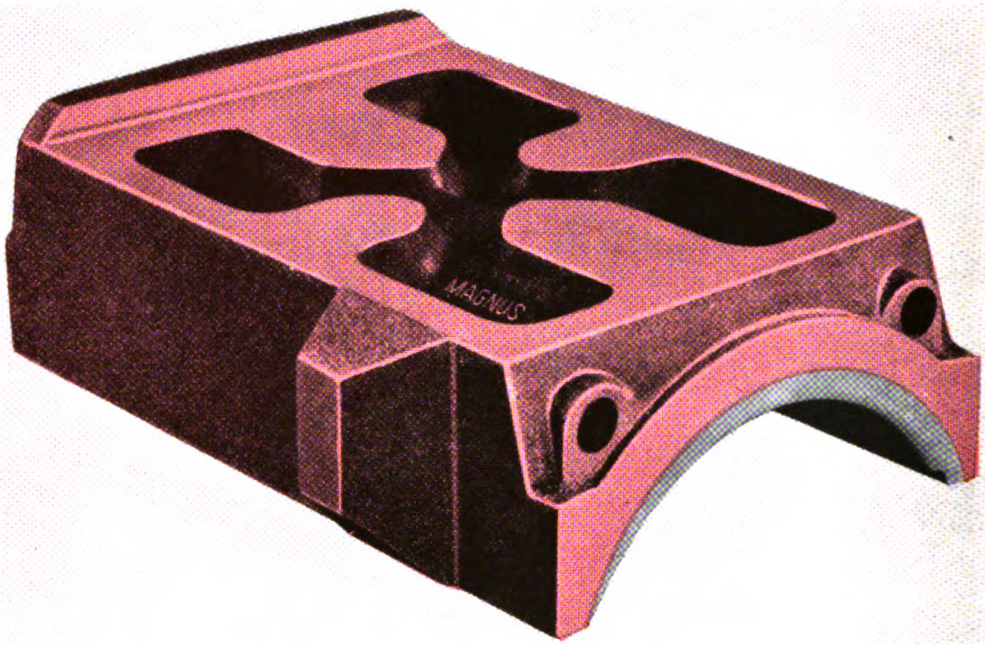
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the LOW-COST way to stabilize journals and get still better freight car performance

Today, freight cars with lubricators average better than four times the performance with waste packing in 1954—and cost per car per year for journal bearing operation and maintenance has been cut more than half. Better still, total costs for *solid* bearings today are less than the fixed charges on the extra investment in roller-type bearings.

The next big step toward improved performance is the *flat-back bearing*—available from Magnus to AAR specification and design, in nominal and step-sizes. It effectively restricts fore-and-aft movement of the journal under all normal operating conditions—makes it possible for the bearing to remain seated on the journal and to provide uninterrupted lubrication.

Several leading railroads are applying flat-back bearings to all new standard interchange freight cars. One railroad is converting existing equipment to flat-backs at repack periods.

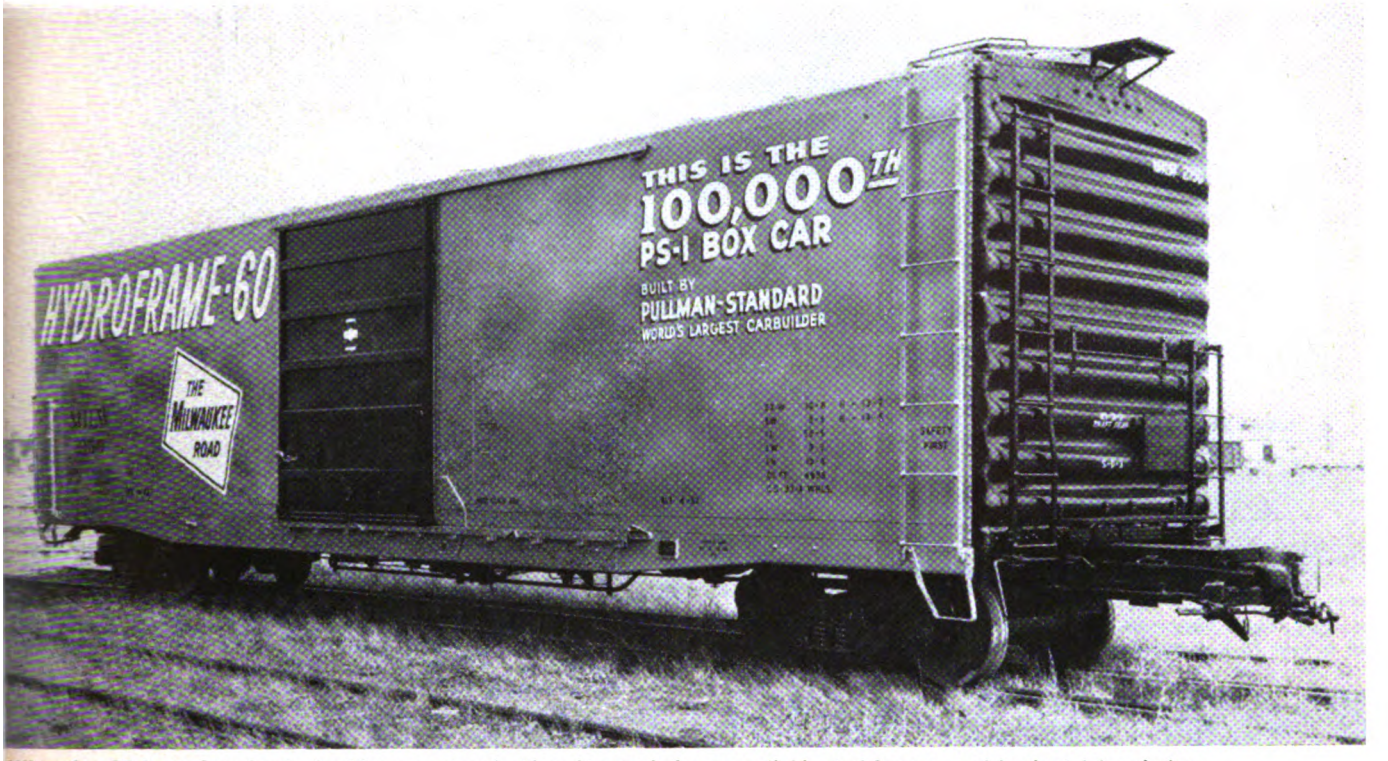
Flat-backs prevent excessive journal displacement—increase the efficiency and service life of present-day rear seals. They require no additional labor to install and, through improved performance, can quickly pay for the slight extra cost.

CURRENT ECONOMICS OF SOLID BEARING OPERATION



New economic study updates AAR Report 20,000 insofar as it covered solid bearing costs in 1954—shows how lubricators have cut these more than half despite increases in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, N.Y. or to 80 East Jackson Boulevard, Chicago 4, Illinois.

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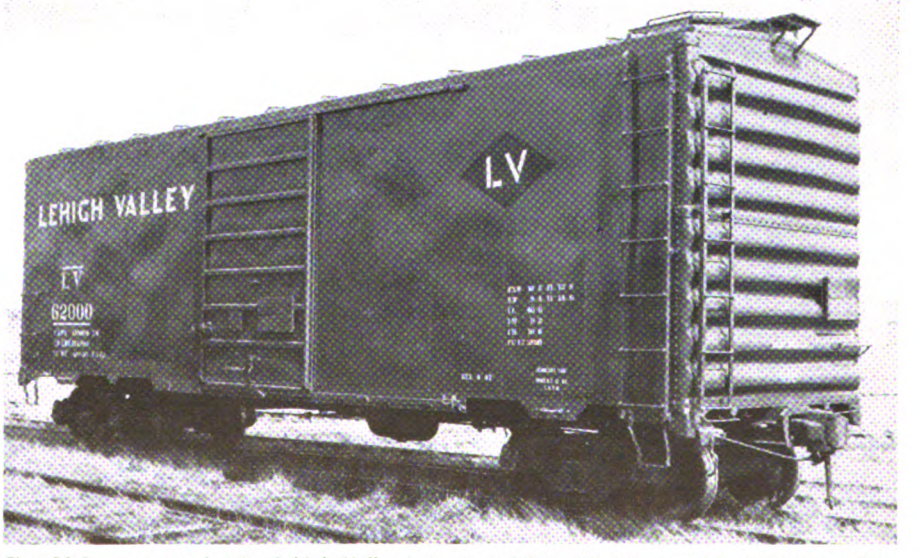
Milwaukee PS-1 was first of order for 10 cars equipped with cushion underframes, nailable steel flooring, and load retaining devices.

PS-1 Has Changed To Meet New Needs

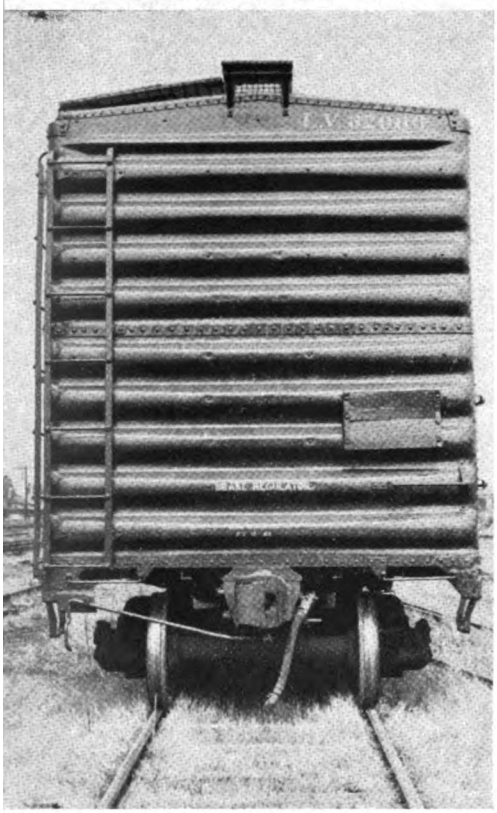
A 50-ft 6-in box car with Hydroframe-60 underframe delivered to the Milwaukee last month is the 100,000th PS-1 box car built by Pullman-Standard. Displayed also at the ceremony marking the event at the P-S plant in Michigan City, Ind., was the first PS-1 —Lehigh Valley 62000—which was one of a lot of 500 cars produced for the LV in 1947. During the 15 years, 94 purchasers have ordered more than 101,000 of these standardized box cars in lots of from 1 to 1000. Several roads have placed over a dozen repeat orders.

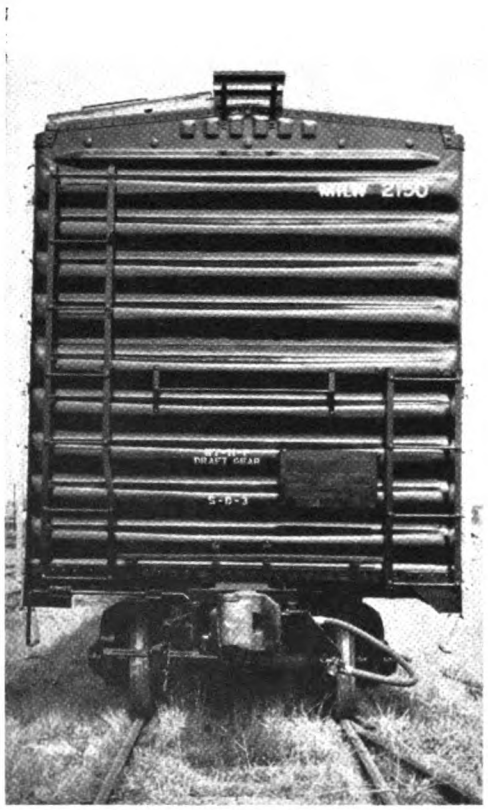
LV 62000 was a "first" in many ways. It was the first standardized all-welded box car and the first of a diversified series of standard PS cars to follow. Years of field and laboratory research went into its design, assuring that this car could serve equally well in all types of service. Soundness of the design has been proved beyond all doubt. After 15 years of continuous service, LV 62000 is still in revenue service, having received only running repairs and normal periodic upgrading during this time.

Success of the first PS-1 box car led to Pullman-Standard's later decision to standarize other freight cars, with the result that, today, the company offers five standarized cars to the railroads—the PS-1, the PS-2 covered hopper car, the PS-3 open-top hopper,

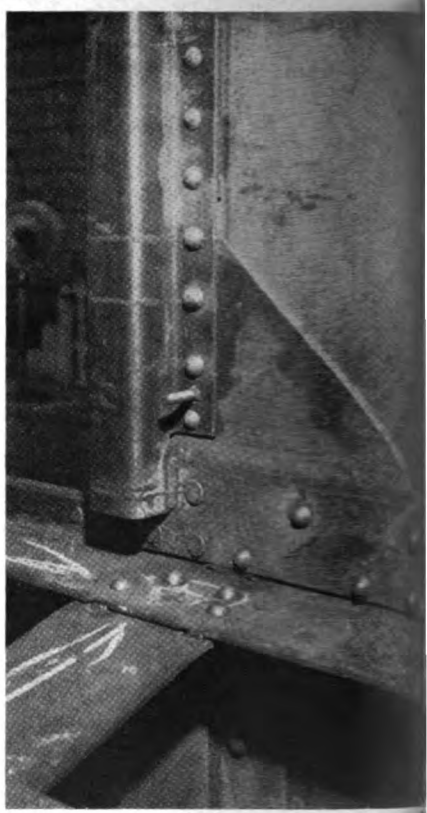


First PS-1 was upgraded by Lehigh Valley prior to exhibit with latest model at Michigan City.





Welding (right) has replaced riveting (left) for joining two end sections. Although integral end sill is now PS-1 standard, Milwaukee specified that its cars have separate sills.



Internal gusset at box-secton door post has now been supplemented by exterior gusset.

the PS-4 line of flat cars for piggyback service, and the PS-5 gondola.

Until 1946, rolling stock was tailored to meet the specifications of individual railroads. Carbuilders usually were required to retool for each lot of cars, resulting in high costs and slow production. It always involves additional expense to build new jigs, fixtures, dies and tools for each lot of new cars. Since 1946, when one boxcar standard design was selected by Pullman-Standard, those methods were eliminated and mass production of cars has been possible. Welding also brought about major economies. Pullman-Standard believes the all-welded car has the advantage of lower first cost, simplification of repairs, and greater strength for a given weight.

Despite the proved soundness of design of LV 62000, Pullman-Standard has continued to study railroad and shipper requirements and materials handling techniques. More advanced construction methods evolved and new materials were developed, tested, and used where practical. As a result, nearly every lot of PS-1 box cars built since 1947 has some improvements over the previous lot. PS-1's are produced at Michigan City and Bessemer, Ala.

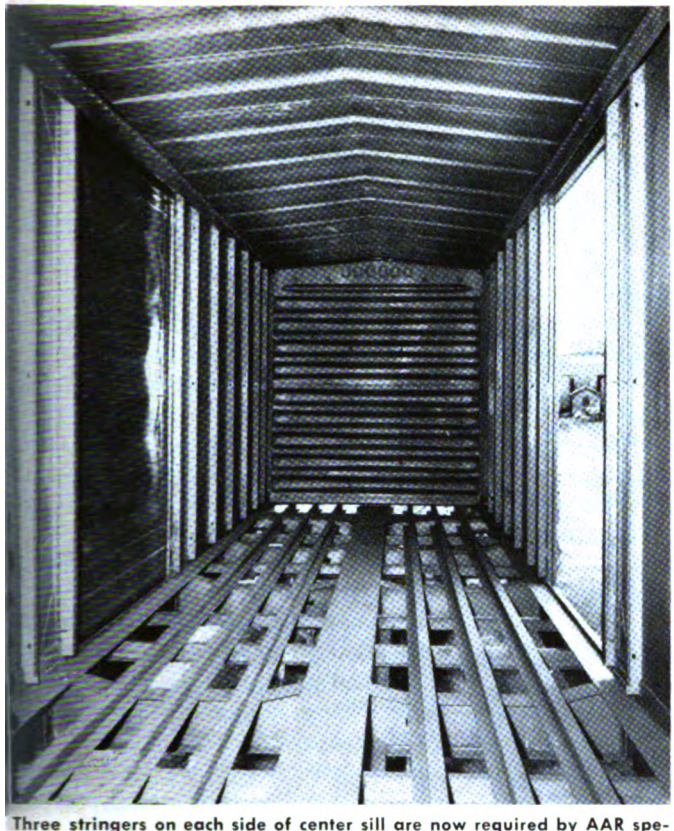
Today's PS-1 incorporates more than 300 changes in design from that of the first car without disturbing the original principle of standardization. Some improved construction; others reduced costs to the railroads; a few facilitated purchase of materials, and occasionally an AAR Mechanical Division ruling made changes necessary. Extensive and continuous testing by Pullman-Standard produced redesign in some vital areas of the car which contribute to strength and economy. Design improvements and subsequent changes result from inspections made by engineers of the P-S sales and service group. While most of the changes have been minor, a few important changes have been made.

Typical was the new design introduced in March 1954 when the steel end was changed to include an integral end sill and the end components were welded together instead of being riveted. The bottom sheet was made of $^{5}/_{16}$-in. instead of ¼-in. plate, and the corner post was changed to a Z-bar. The end ladder was changed to fit the new end by moving the clips. The improved construction made a stronger end while simultaneously reducing its cost. Without riveted lap joints at the center seam and end sill, corrosion pockets and the possibility of loose rivets were eliminated, producing a permanently watertight end. There was no possibility of trapping dirt behind the new corner post.

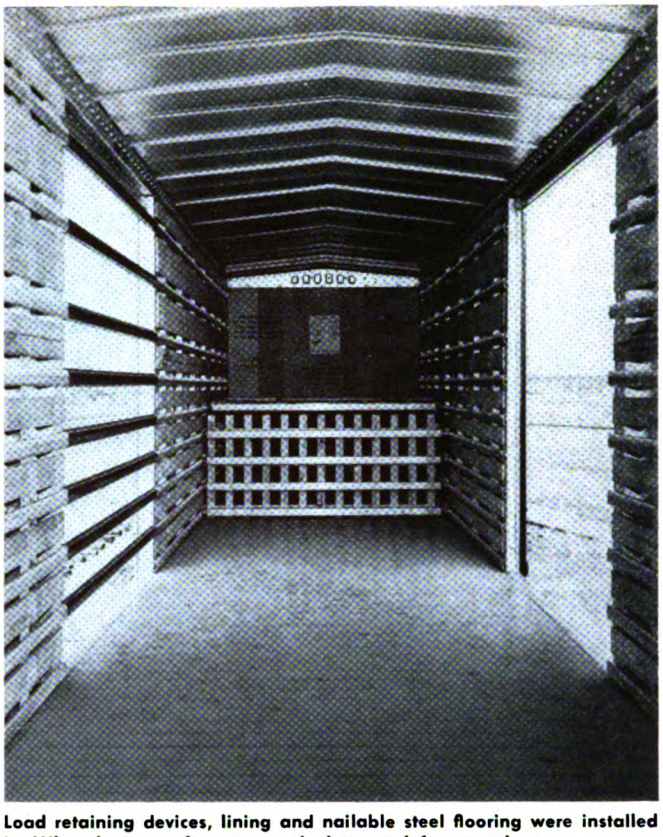
In a change made to reduce cost, the wood decking was extended to the side sill in the doorway area, eliminating the floor fillers under the threshold plates. Enough of these full-length boards are used so they will extend under the door posts.

In 1957 the sill-step support was changed from a ¼-in. pressed angle to a 5-x 3-x $^{5}/_{16}$-in. rolled angle. This improved construction reduced maintenance costs for railroads. The original pressed supports were frequently found bent and torn in service. The vertical rivets joining the supports to the horizontal leg of the side sill became loose and broke off. Replacement was difficult while the car was in service. The rolled-angle supports which are welded and riveted to the side sill make a stronger attachment and are less likely to be damaged in service.

Two changes in the same item not only improved construction and facilitated production, but made it easier to purchase steel. The side-sill angle was first changed from a 6-x 3-x $^{5}/_{16}$-in. to a 6-x 6-x $^{5}/_{16}$-in. angle. With the 6-x 3-x $^{5}/_{16}$-in. angle, some railroads wanted the 6-in. leg vertical, others horizontal. This made necessary the



Three stringers on each side of center sill are now required by AAR specifications. PS-1 design was altered to incorporate this.



Load retaining devices, lining and nailable steel flooring were installed in Milwaukee car after structural photo at left was taken.

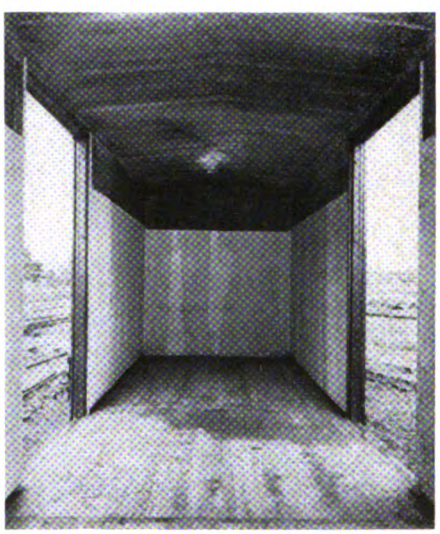
constant changing of the side construction, underframe members, underframe jig, and floor board lengths. Adoption of the symmetrical $^{5}/_{16}$-in. angle as a standard eliminated these changeovers. Subsequently it developed that the 6-x 6-x $^{5}/_{16}$-in. angle was not available in the Bessemer district. It was less expensive to purchase a $^{3}/_{8}$-in. angle there than to buy the $^{5}/_{16}$-in. angle in Chicago and ship it to Bessemer. Consequently, the $^{3}/_{8}$-in. angle was made standard, keeping all PS-1's alike, regardless of where they were built. This section does give additional strength in the sides and provides greater resistance to corrosion.

The door post is now a pressed-box section fabricated of ¼-in. plate which replaced a 4-x 3-x ¼-in. angle previously used. This change provides more strength and simplifies application of load-retaining equipment. The gussets at the side sill and side plate are welded to the box type post, forming them into an integral subassembly.

Nuts with nylon inserts are now used on bolts securing the cylinder, reservoir, AB valve and retainer valve in place of the regular nuts and locknuts formerly used.

Since its introduction, the PS-1 design has been flexible so that car arrangements could be made to fit individual railroad needs. Cars have always been available in 40-ft 6-in. and 50-ft 6-in. lengths. Door openings can be 6, 7, 8, 9, 15 ft or more wide. Accessories, such as the P-S cushion underframe and various types of load retainers, can be installed.

Some of the improved design features and alternative arrangements were obvious last month when the first PS-1 and its latest counterpart were spotted side by side at Michigan City. The 100,000th PS-1—gold painted Milwaukee 2150—may look quite similar to LV 62000 built in March 1947, but the changes and improvements are many and important. Wider doors permit faster unloading with mechanized equipment. Car length has been increased by 10 ft; the width is greater, and the car capacity has been raised from 100,000 to 135,000 lb—all to provide greater carrying capacity. The 100,000th PS-1 has a nailable steel floor instead of wood to provide added strength and reduce maintenance. Milwaukee 2150 is equipped with load retainers and the P-S Hydroframe-60, a hydraulically cushioned underframe that provides protection at impact speeds up to 12 mph. This type of protection for boxcar lading was not available at the time the first PS-1 was built.



Complexity of today's Milwaukee PS-1 contrasts with upgraded interior of LV 62000 with wood floor, wood lining, and no loading devices.

Some of the major differences between the first PS-1 and the latest model include:

	First PS-1	Latest PS-1
Inside length, ft-in.	40 - 6	50 - 5
Inside width, ft-in.	9 - 2	9 - 3¾
Side door openings, ft	7 - 0	9 - 0
Capacity, cu ft	3,899	4,935
Capacity, lb	100,000	135,000

Rubber Suspension Cuts Motor Impact

Cushioning in traction motor nose suspensions can be important factor in motor performance

By C. F. Simon, Jr.

The use of rubber in traction-motor nose suspensions has led to significant reductions in the impact forces transmitted to traction motors. This should serve to increase the life of various motor components. Because of their advantages, rubber suspensions are now used by several locomotive manufacturers. As yet, the life of these suspensions has not been determined. However, several mounts have now been operating for two to three years.

Presented at the ASME-AIEE-EIC Railroad Conference at Toronto, Canada, on April 10. Mr. Simon is supervisor, Motor Mechanical Design, Locomotive and Car Equipment Department, General Electric, Erie, Pa.

While the cost of the rubber suspension is somwhat higher, its improved characteristics are worth some added cost.

Although there are various methods of suspending the traction motor in the truck, the one most commonly used is axle mounting. This gives three points of attachment between the truck and the motor frame. Two of these points are the suspension bearings clamped around the locomotive axle. At the third point, the motor is attached by a flexible arrangement to the truck.

Because the motor frame is free to rotate about the axle on its suspension bearings, it is the function of the nose suspension to accept the torque reaction of the motor. This reaction can be either upward or downward, depending on whether the motor leads or trails the axle, and whether the locomotive is going forward or in reverse. Motors can develop torque both for traction and electric braking. Because the motor must have lateral clearance on the axle, allowance must be made at the nose suspension for lateral motion between the traction motor and the truck.

Improper functioning of the nose-suspension arrangements has led to difficulties and failures in service. The failures most commonly attributable to this suspension have been broken nose-suspension lugs, slipped pinions, and occasional cracked pinions. Shock forces introduced into the motor through the nose suspension are known to produce injurious effects on the motor insulation and other components which are affected by vibration.

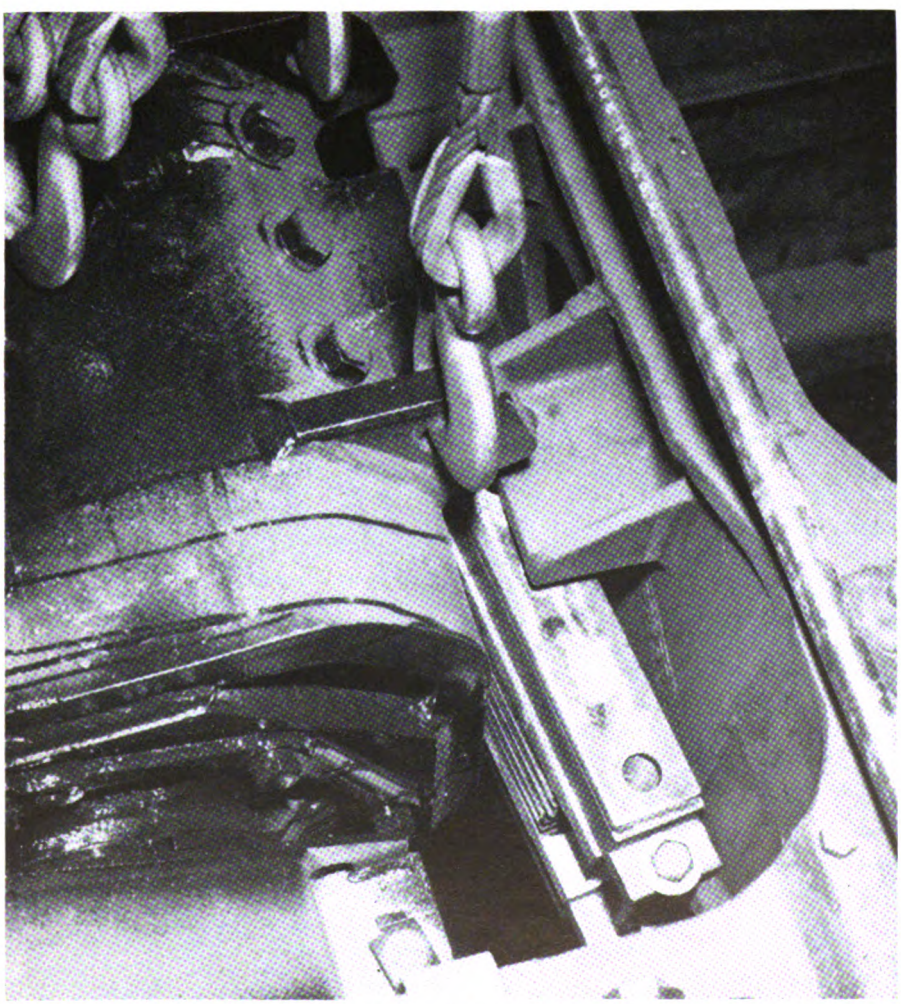
Two of the most important motor-suspension design factors are:

- A non-bottoming feature;
- A high damping characteristic.

Other factors requiring consideration are the amount of backlash or free motion, spring gradient, spring preload, and wear resistance. Usual design factors of first cost, ease of maintenance and replacement, and long life apply to the motor-nose suspension.

The steel coil spring has been the conventional type of spring used in nose suspensions. When such a spring goes solid, high impact forces result. Under severe conditions, these impact forces can cause immediate failure of some motor parts. The result may be the brittle fracture of the motor nose lug, or a slipped motor pinion. Even when the impacts are not of sufficient magnitude to cause sudden or disastrous failures, the impact energy is still transmitted to all parts of the motor and can result in reduced life. The most suitable type of spring is one which has a nonlinear characteristic so that spring gradient increases with deflection, meaning the spring will not go solid.

A fairly large deflection is required



Rubber suspension can be fitted into same mounting position as steel springs. Here rubber assembly is partially inserted between nose lugs on truck transom and motor.

produce "bottoming" of coil springs. is normally occurs after the motor d its spring system have gone ough a period of deflection build-. One phenomenon which can pro-ce this is "chattering" resulting from heel slip. Assume that motor torque traction is such that it produces a wnward deflection in the spring sys-n. When the wheel slips, the reac-n to torque and the torque itself are ddenly removed from the motor and e motor nose moves upward. As on as the torque produced by the otor has decreased sufficiently, slip-ng ceases and motor torque again ilds up. This, once again, produces downward deflection. As the wheel ternately slips and grabs, the deflec-n at the nose suspension will be al-rnately downward and upward. If e frequency of this alternating de-ection is close to, or at, a resonant equency of the motor-suspension stem, the amplitudes will easily uild up until the springs finally bot-m with a high-energy impact. In evere cases, chattering may be so vio-nt that the entire locomotive vi-rates as it occurs.

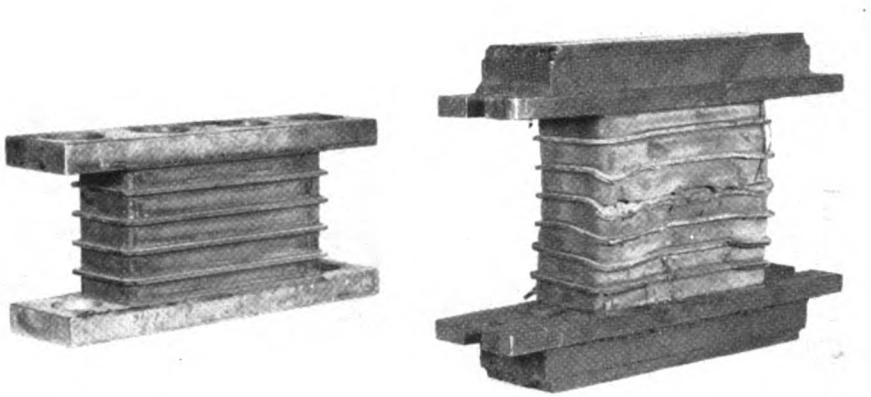
Natural Frequency

The natural frequency of the sys-em depends primarily on the suspen-ion gradient and the mass of the mo-or and, secondarily, on motor and ruck configuration. Truck design also ffects the slipping tendencies, so chat-ering tendencies can vary. Because his is a forced-vibration situation, it s not necessary to be at the exact reso-ant frequency of the system to force large amplitudes.

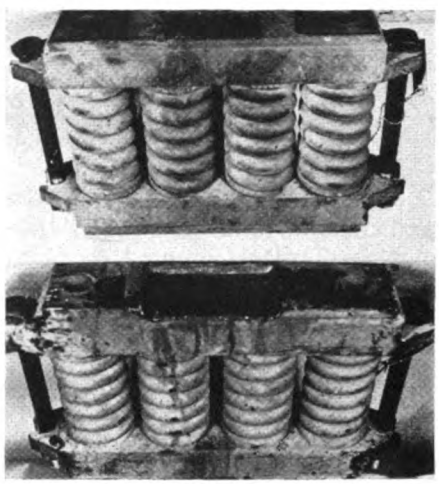
In actual service, this phenomenon is most frequently encountered when attempting to start with a heavy load, or hauling a train at low speeds. It has also been known to develop at high speeds during low-torque conditions when operating over rough track.

If the motor nose-suspension sys-tem is designed with a high damping characteristic, this build-up of deflec-tion can be prevented. Although an optimum value of the damping factor has not been completely defined, a minimum value of 0.2 has been estab-lished as desirable. The rubber sus-pensions used in tests involving six dif-ferent locomotives have a damping factor of approximately 0.4 and in no case could chattering due to wheel slip be developed.

Backlash or free motion in the sus-pension system is undesirable because it allows for the build-up of kinetic energy of the motor when passing through this backlash zone as the deflection is changing direction. Even if the kinetic energy may not build up to a point that would produce bottoming of the springs, it causes the mating members of the motor, suspension, and truck to come together with impact. This produces a peening type of wear often visible on the motor nose and suspension parts. Practically all of the present conventional designs of nose suspensions have some backlash because of manufacturing tolerances and wear in service. A practical limit should be established for allowable backlash. As a general rule, backlash should not be allowed to exceed ¼ in.



High rubber assembly (right) showed buckling after 205,000 mi of operation. Shorter unit (left) performed satisfactorily during this interval on the same locomotive.

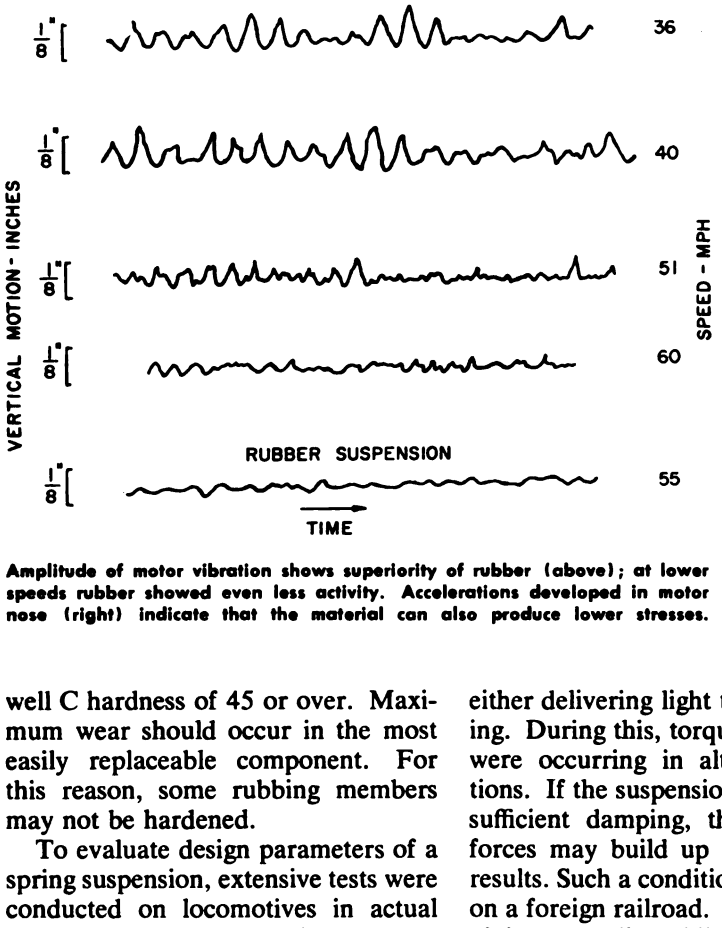


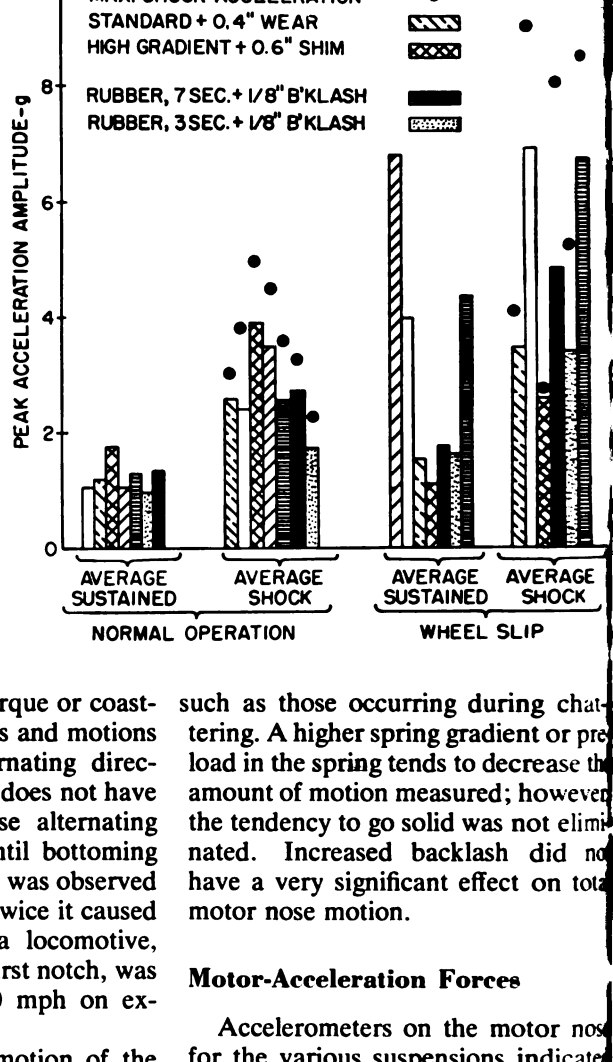
Two steel-spring groups were tested on locomotive used for rubber suspension tests. After 205,000 mi, bottom group with ¾-in. shim had developed much higher wear.

Some preloading in the spring system is desirable because it reduces the degree of motion and the resultant impact loading. On the other hand, there is relative motion between the motor and truck which causes rubbing wear to take place between elements of the suspension, motor, and truck. The higher the compressive load existing when this motion occurs, the greater the wear will be. Excessive preload has the disadvantage of producing greater wear. A suitable range for the preload value results if the average or nominal preload is made equal to the gravity reaction force of the motor. The range of the preload is determined by taking into account the manufacturing tolerances and allowable service wear.

The precise value of spring gradient does not appear to be critical if it is selected so as not to produce a suspension system with a natural frequency in resonance with truck components. There should be sufficient stiffness to prevent high deflections, since rotation of the motor around the axle is undesirable. Springs of extremely high stiffness are also undesirable because they cause high-energy impacts to be transmitted to the motor. Wear can also result in rapid loss of preload. Current suspension designs, with spring gradients in the range of 10,000 to 30,000 lb per in., appear to be satisfactory.

Suspensions must allow for the wear of mating steel members, since the traction motor has motion relative to the truck. The ideal suspension would be one which would allow the necessary motion to be taken as deflection in suspension members, without any scrubbing or hammering motion between its parts. Since this ideal suspension involves major changes both in the truck and motor, it is likely that present designs, which allow for the rubbing of steel parts, will continue to be used for some time. To minimize wear, the rubbing steel surfaces should be made of a hardened material with a Rock-





Amplitude of motor vibration shows superiority of rubber (above); at lower speeds rubber showed even less activity. Accelerations developed in motor nose (right) indicate that the material can also produce lower stresses.

well C hardness of 45 or over. Maximum wear should occur in the most easily replaceable component. For this reason, some rubbing members may not be hardened.

To evaluate design parameters of a spring suspension, extensive tests were conducted on locomotives in actual service. Different suspension arrangements were tested involving variations in spring gradients, variations in the backlash, and variations in load, both with steel springs and rubber. The non-bottoming and damping effects possible with rubber were also evaluated.

During operation on the GE test track at Erie, Pa., the motor was more highly instrumented than was the case for most of the service tests. Strain gages and slip rings were used to take data on shaft torque and pinion-tooth stresses.

Maximum Torque

The maximum torque measured on the pinion occurred at the ends of periods of chattering due to wheel slip. Torque measurements equivalent to 93% adhesion at the rail were obtained when a steel spring type suspension bottomed. The highest measured values of pinion torque that were not connected with bottoming of the suspension were equivalent to a coefficient of adhesion of 63%.

Some abnormal torque values were measured when the locomotive was running at high speed with the motor either delivering light torque or coasting. During this, torques and motions were occurring in alternating directions. If the suspension does not have sufficient damping, these alternating forces may build up until bottoming results. Such a condition was observed on a foreign railroad. Twice it caused pinions to slip while a locomotive, with the throttle in the first notch, was going downgrade at 60 mph on extremely rough track.

Rubber does damp motion of the motor nose, preventing high loads resulting from bottoming of the steel-spring suspension. The damping effect of the rubber suspension is readily apparent in the handling of the locomotive. In one instance where rubber had been substituted for steel-spring suspensions on a switching locomotive, the engineman thought the locomotive had been "depowered" because he could no longer make it "chatter" when starting a heavy load.

Road tests with a gas-turbine-electric locomotive showed that motion on the steel spring assembly increased with speed reaching a maximum at approximately 40 mph and then decreased. Such a critical speed will vary with the type of locomotive, the motor spring system, and the condition of the track.

Seven different types of spring suspensions were tested on locomotives in service in a foreign land. All except the rubber suspensions showed the disadvantages of going solid when subjected to large amplitude motions, such as those occurring during chattering. A higher spring gradient or pre load in the spring tends to decrease th amount of motion measured; however the tendency to go solid was not elimi nated. Increased backlash did no have a very significant effect on tot motor nose motion.

Motor-Acceleration Forces

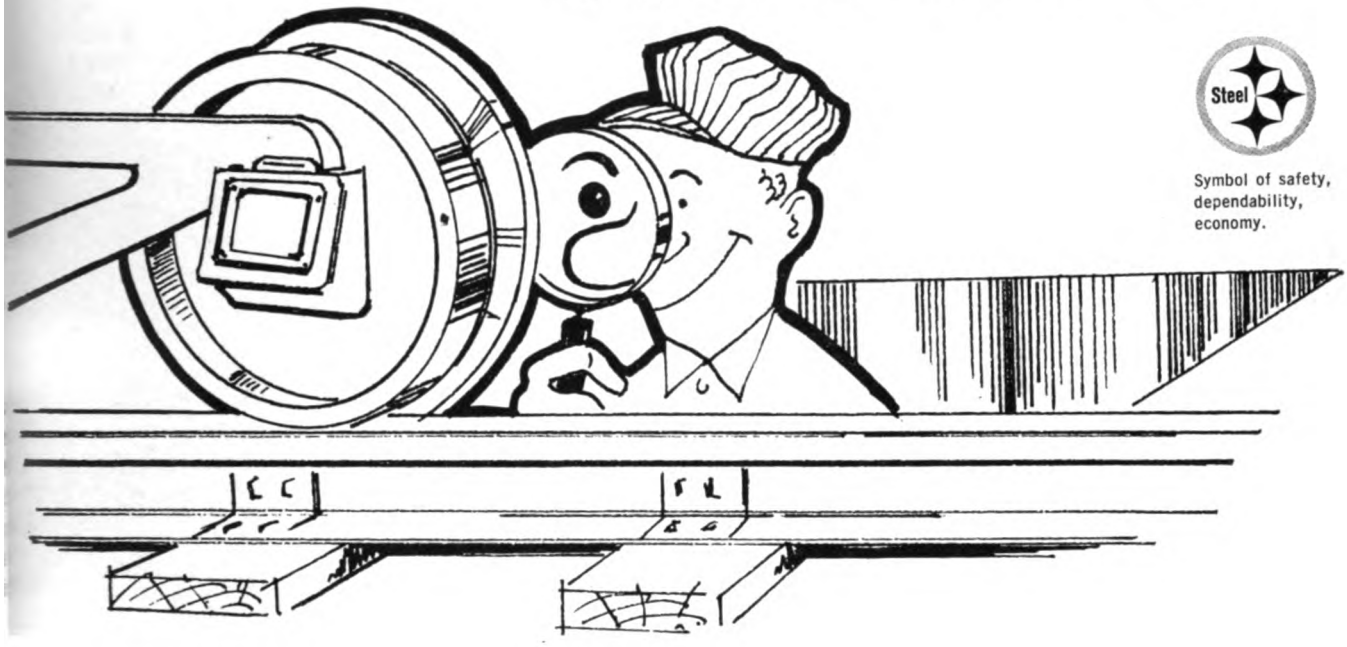
Accelerometers on the motor nos for the various suspensions indicate that the springs which are stiffer, either because they are preloaded or have a higher gradient, do transmit higher ac celeration forces to the motor. As wa generally expected, data based on ac celeration forces does not show the same advantage for rubber as doe other data.

On the axle side of the motor frame near the axle cap the G forces are much higher during normal operation indicating that most of the impact enter the motor frame through th axle. The type of nose suspension ha little affect on these impacts.

The frequency of the disturbance usually varies with speed of the loco motive and can be tied in with certain physical characteristics. The vertical frequencies of the motor nose and both journal boxes have a straight-line relationship wtih locomotive speed There is a correlation between rail joints and the frequency of motions transmitted to the motor. The fre quency correlation was always appar-

(Continued on page 34)

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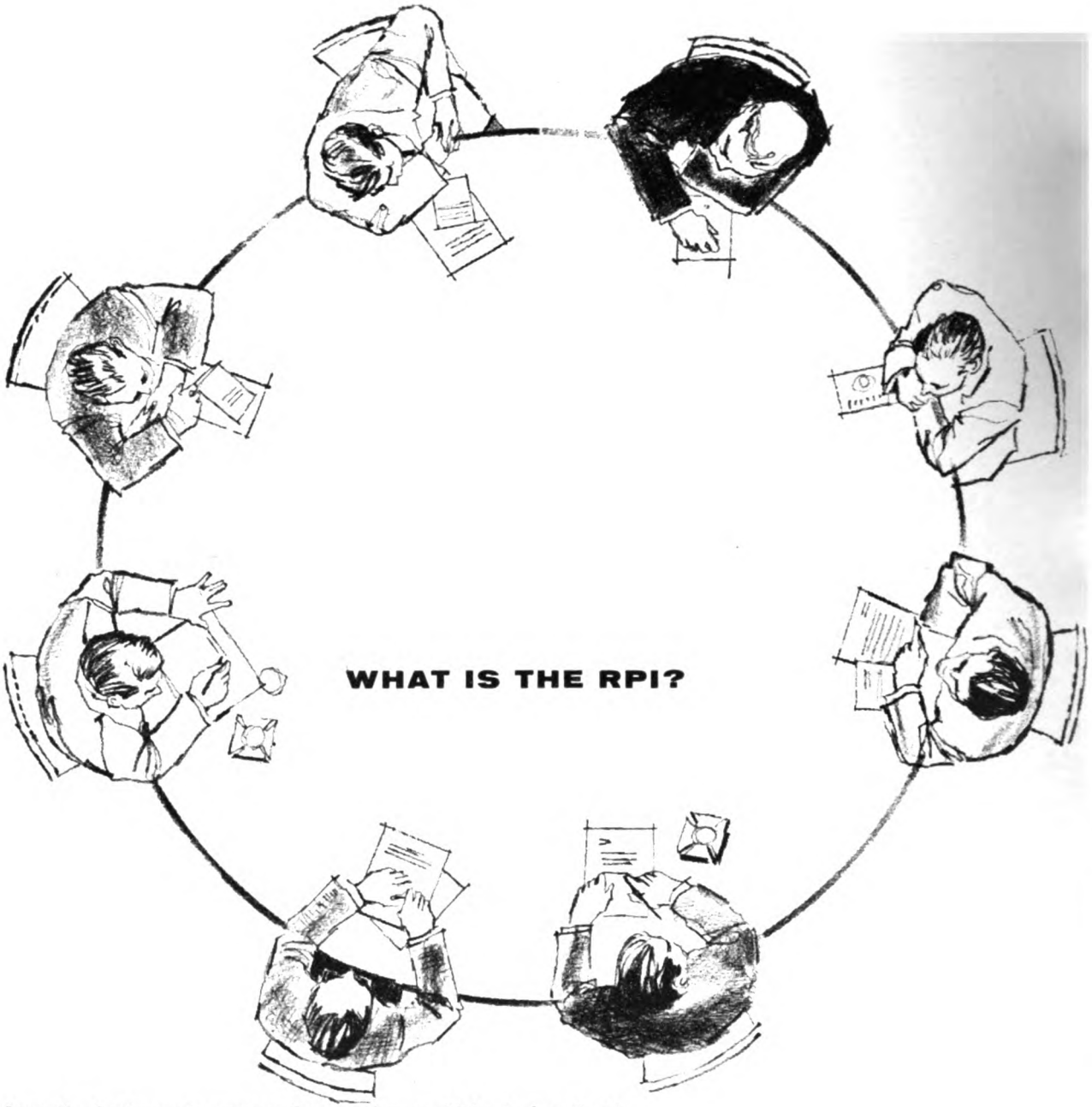
First of the Revolutionary GP-30's
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WHAT IS THE RPI?

Perhaps the best way to answer the question would be to describe the difference between a "railway supplier" and an "RPI railway supply man."

"RPI railway supply men" work together for the good of the *supply* industry. Through coordinated research and contributions of time and money, they gain closer understanding and better sales and service techniques for selling to the railroads.

One of the most effective ways *"RPI* railway supply men" work for the good of the supply industry is in working together for the good of the *railroad* industry. Their futures rise and fall together.

The "railway supplier" works by himself. He *may* work too, for the good of the railroads, but his is a lone voice.



This, then, is the best way to answer the question in the headline.

Railway Progress INSTITUTE

38 South Dearborn Street • Chicago, Illinois

Behind this insignia is an "RPI railway supply man."

389



New hoppers, fitted with composition brake shoes, represent one of the largest groups of interchange cars so equipped.

Pellets Handled in 85-Ton Hoppers

A Reading order for 400 triple-hopper cars, to be used primarily for moving iron ore pellets, has been completed at the Johnstown, Pa., plant of Bethlehem Steel. Acquisition of the 85-ton hoppers at a cost of approximately $5 million has been an important phase of the Reading equipment program which E. P. Gangewere, president, says is intended to "increase efficiency, meet competition, and fulfill future traffic requirements."

The new open-top cars, although available for general service, will largely be used for moving ore pellets from the Bethlehem mines and pelletizing plants at Cornwall and Morgantown, both in southeastern Pennsylvania, to Bethlehem Steel furnaces at Bethlehem, Pa. The car, basically a welded design, has a capacity of 2,868 cu ft. The light weight is 61,000 lb.

Dimensions are similar to those of the 85-ton hopper which the Norfolk & Western first ordered just over two years ago (RL&C, April 1960, p 37, and Nov. 1960, p 25). Since then, cars of this general configuration have been increasingly popular, almost 4,500 having been ordered. Eventually, the 70-ton model may be of only minimum utility as greater emphasis is placed on heavier loading by railroads and shippers.

OHS copper-bearing steel is used for all parts which contact the lading. All of the lighter structural members in the car are copper-bearing steel. The center sill is composed of a pair of 41.2-lb Z-12 sections and is welded 10 in. inboard of each bolster to a cast-steel draft sill. Each of the draft-sill castings incorporates the bolster center brace, body center plate, front and rear draft lugs, striker, and coupler carrier as integral features. Draft gears on 200 cars are Miner RF333 rubber-and-friction type and on the remainder are Cardwell-Westinghouse Mark 50, friction type. Body bolsters are formed from 24-in. wide flange beams weighing 84 lb per ft.

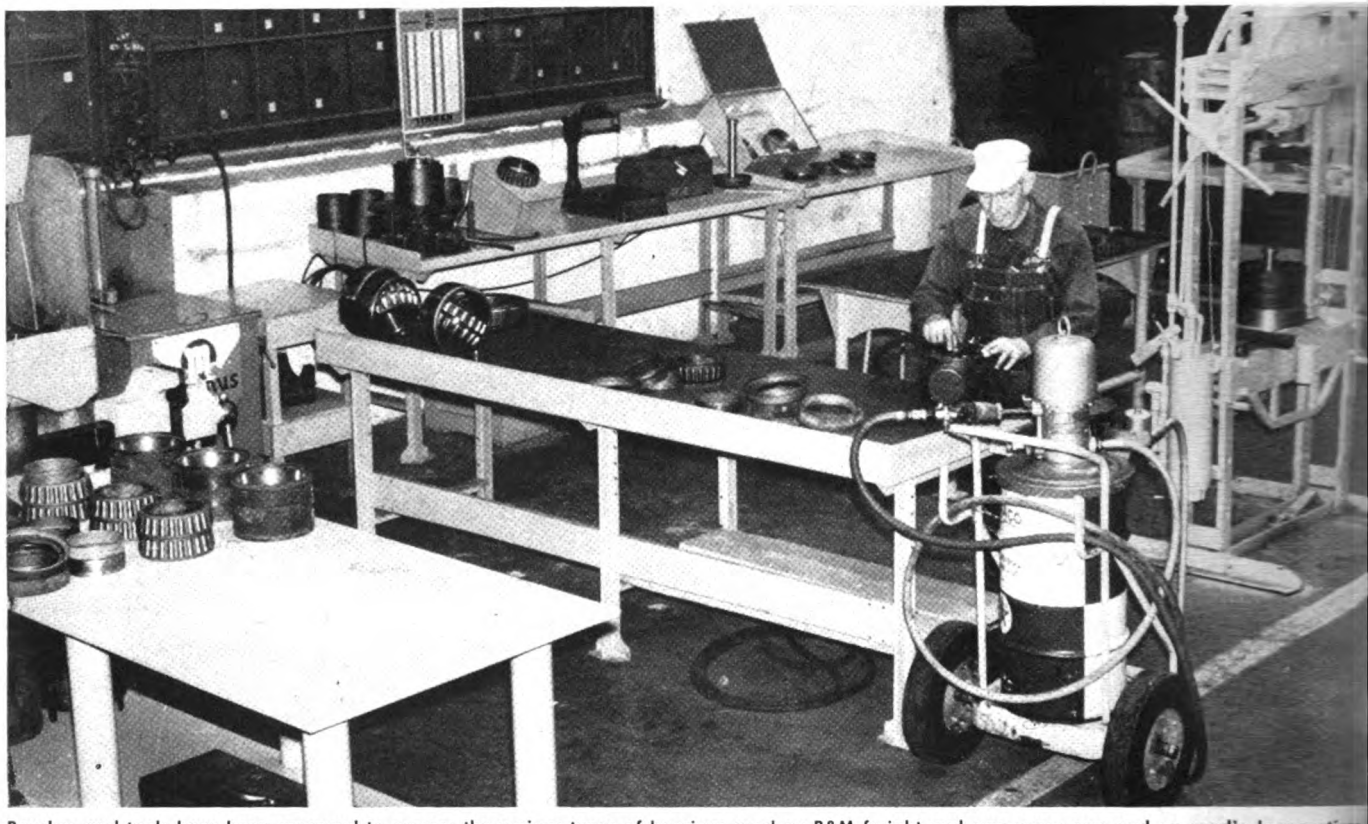
The car side is primarily a riveted assembly. To resist the damaging effects of car dumpers, the top chord, a 5-x 4½-in., 19.1-lb bulb angle, is reinforced at each end with a 12 ft 6 in. length of 4-x 4-x ½-in. angle. The pressed side stakes, which at all other points are only riveted to the ¼-in. side sheets and structural members, are both riveted and welded to the top chord between its reinforced portions. Cast-steel crossridge braces are used in the carbody. Upper floor sheets are $\frac{5}{16}$-in. plate, and lower floors, crossridges, longitudinal hoods, and hoppers are ⅜-in. plate.

All 400 cars are equipped with Cobra composition brake shoes. Each car has a carrier for four extra composition shoes, an AAR Mechanical Division requirement on all equipment with composition shoes. All cars have Ellcon-National Type 1340-3 automatic brake regulators.

Trucks are spring plankless type with 2½-in. spring travel and have Barber S-2A snubbers. The 6½-x 12-in. axles on 100 of the cars are fitted with SKF "Expediter" roller bearings and 300 with the Timken "AP" type. Wheels are J-36, 36-in., heat treated two-wear wrought-steel.

Partial List of Suppliers

Truck lever connections	Schaefer Equipment
Wheels and axles	Bethlehem Steel
Springs	American Steel Foundries
Side frames, bolsters, and coupler yokes	Birdsboro
Side bearings	A. Stucki
Pedestal adapter and keys	National Castings
Snubbers	Standard Car Truck
Roller bearings	SKF Industries
	Timken Roller Bearing
Brake shoes	Railroad Friction Products
Brake beams	Chicago Railway Equipment
Fasteners	Bethlehem Steel
	Elastic Stop Nut
	Gustin-Bacon Mfg.
	Huck Manufacturing
	MacLean-Fogg Lock Nut
Air brakes	Westinghouse Air Brake
Brake regulator and hand brake	Ellcon-National
Couplers	National Castings
	Symington Div., Symington-Wayne
Coupler release	Standard Railway Equipment
Draft gears	Cardwell-Westinghouse
	W.H. Miner
Draft sills	American Steel Foundries
	Scullin Steel
	Symington Div., Symington-Wayne
Center plate lubricators	DO Co.
Body material	Bethlehem Steel
Corner castings	National Castings
Inside brace	Scullin Steel
Door frames and hinges	Wine Railway Appliance
Door locks	Keystone Railway Equipment
	Wine Railway Appliance



Benches and tools have been arranged to process the various types of bearings used on B&M freight and passenger cars and on road's locomotives.

B&M Establishes Roller-Bearing Shop

With all its road locomotive and passenger cars and a large number of its freight cars on roller bearings, the Boston & Main has now established a shop for inspecting and rebuilding these precision bearing assemblies. An area at the B&M Billerica, Mass., shop has been arranged and tooled for the operations necessary to assure that its journal roller bearings will give satisfactory and economical service.

The 127 road locomotive units, the 108 RDC's which now make up the road's entire passenger-car fleet, and the 2,003 freight cars (37.5% of its total ownership) collectively involve almost 18,000 journal roller bearings. During wheel changes, and as part of its program to establish proper inspection intervals, the B&M shop presently

(Continued on page 29)



Check of lateral determines wear on bearing cone spacer. Using magnetic-base lateral-checking gage, wear is read before pulling.



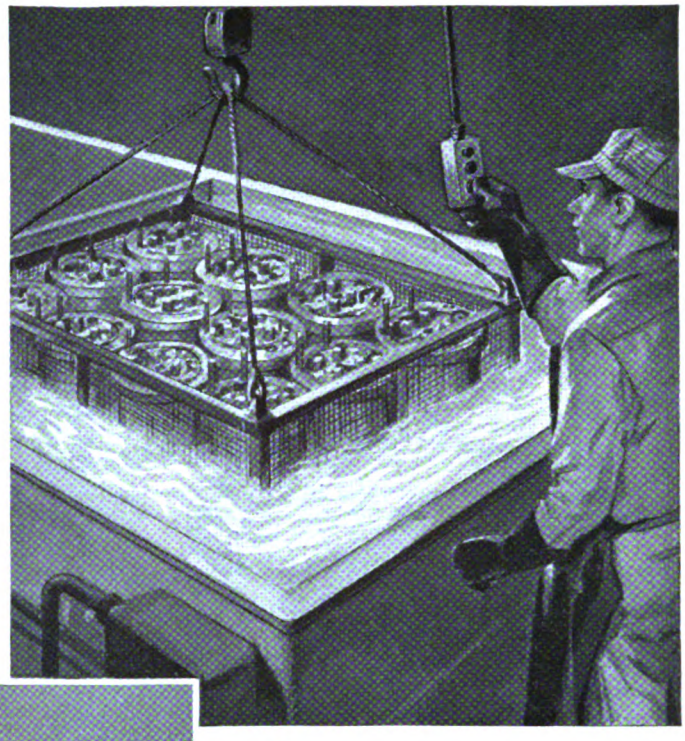
Removal of bearing is done with hydraulic puller-installer. Road's larger ownership of freight cars with rotating-end-cap journal roller bearings is gradually increasing the shop work load as these cars come into shop for wheel work.



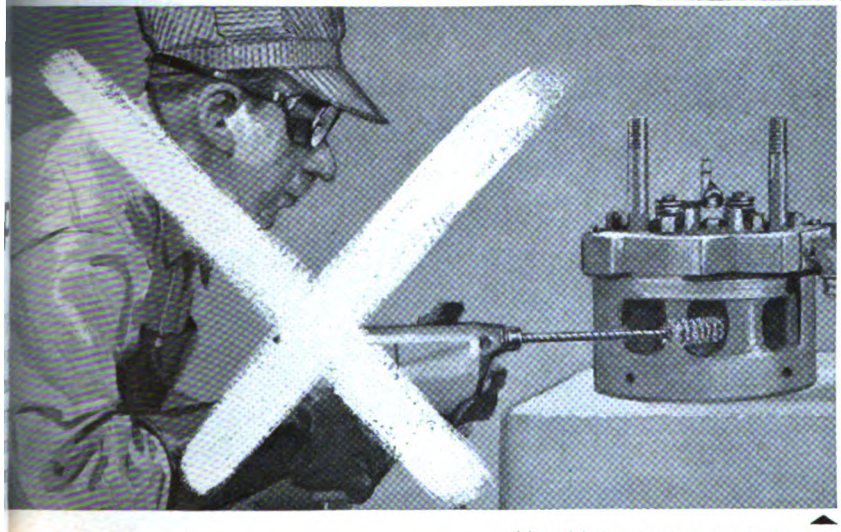
Lateral can be checked on bench fixture if reading is not taken before bearing is removed from axle. High reading indicates excessive spacer wear.

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NUVAT
saves time
. . . by eliminating the second step

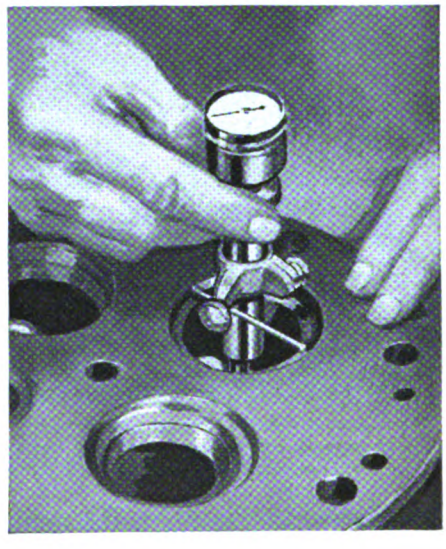


Soak cleaning in tank



Hand labor can be eliminated

Head ready for reclamation



Wyandotte's NUVAT is a heavy-duty soak cleaner that does the complete cleaning job *in the tank.* No need for additional hand labor!

NUVAT works fast and rinses well because its action is promoted with a unique combination of chelating agents and synthetic detergents.

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Wyandotte Chemicals

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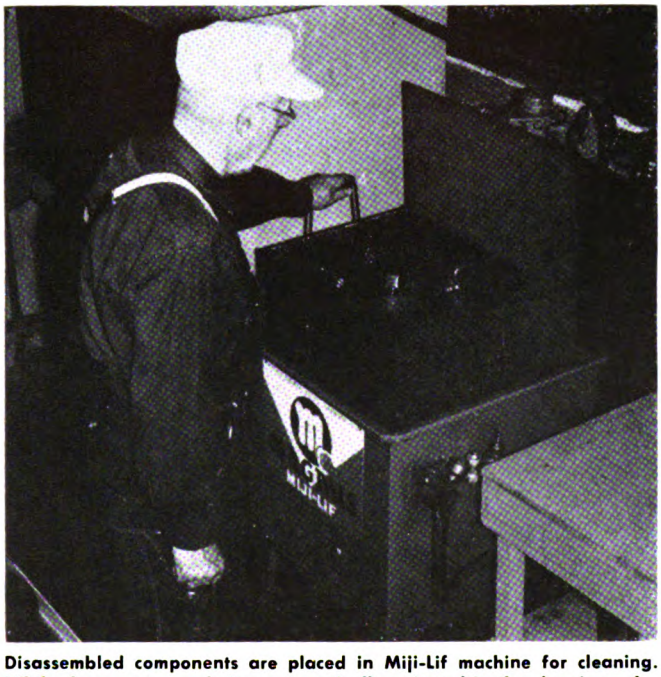
B & M Establishes Roller-Bearing Shop Continued



Seal element removal jaws are fitted into seal assembly before the bearing is moved to press. Tools like this are available commercially.



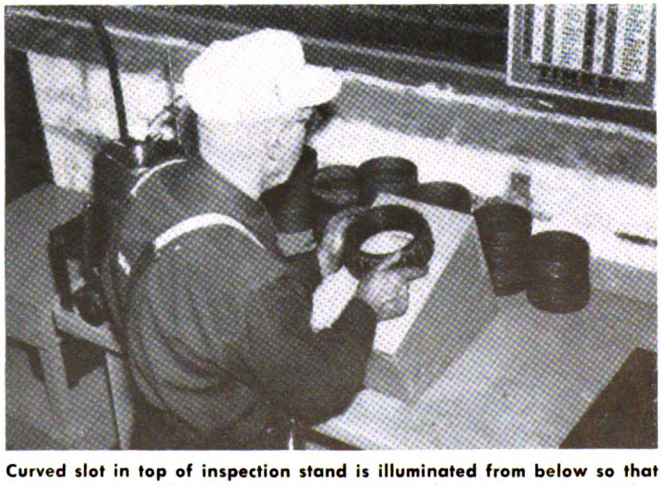
Bearing is disassembled on this hydraulic press. Seal assemblies are freed from outer races and bearing components can then be placed in cleaning machine prior to their complete inspection.



Disassembled components are placed in Miji-Lif machine for cleaning. While these parts are being automatically agitated in the cleaning solution, the operator can perform other shop duties.



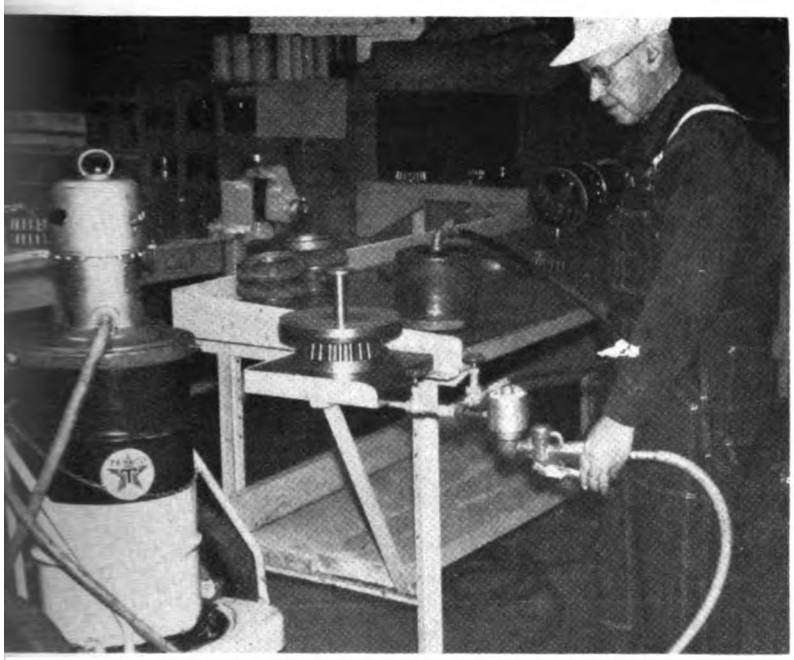
Parts are blown dry under this ventilated hood following removal from the Miji-Lif. Solvent tank is available for additional cleaning. Parts are then ready for the thorough inspection they are given.



Curved slot in top of inspection stand is illuminated from below so that the inner race surfaces can be inspected by placing bearing over slot. Inspector looks for surface cracks and other defects.



Seal element installing plate is placed in seal case as new seal element is prepared for installation. Platen press used for disassembly is also used for this assembly operation.



ıne spacer lubricator has been placed over partially assembled roller bearing to apply e proper quantity of grease before the second cone assembly is applied. Grease is ken directly from shipping drum by lubricating device.



Stocks of parts are maintained for the various types of bearings used on B&M cars and locomotives. No attempt is made to salvage defective parts; they are scrapped.

(Continued from page 26)

isassembles, inspects, and rebuilds pproximately 100 axle roller bearings ıonthly. Equipment can handle either ackage bearings from cars or larger ypes from locomotives.

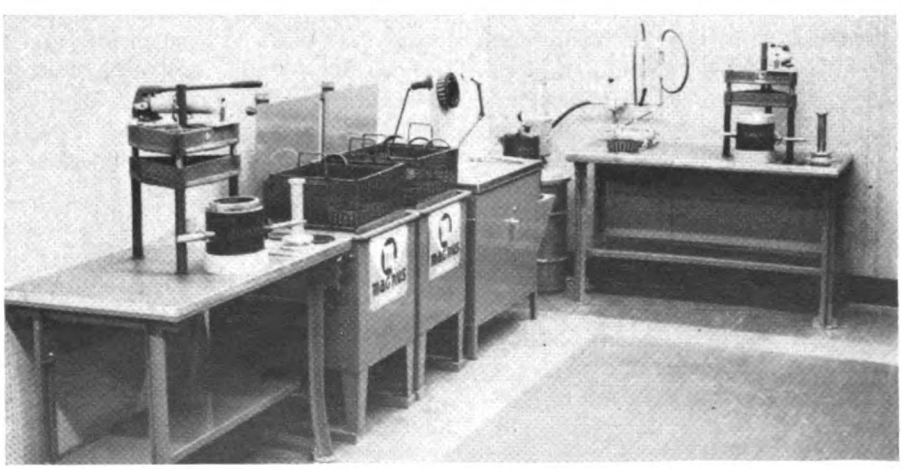
The inspection and servicing equipment installed in the shop has been based on the recommendations of the roller-bearing manufacturers. P. C. Dunn, chief mechanical officer, is quick to point out that the shop is not tooled for high-volume production; instead, he emphasizes that this facility does have all the tools and jigs necessary to do the essential work on a medium size fleet of cars and locomotives equipped with roller-bearings.

Bench Layout for Package Bearings

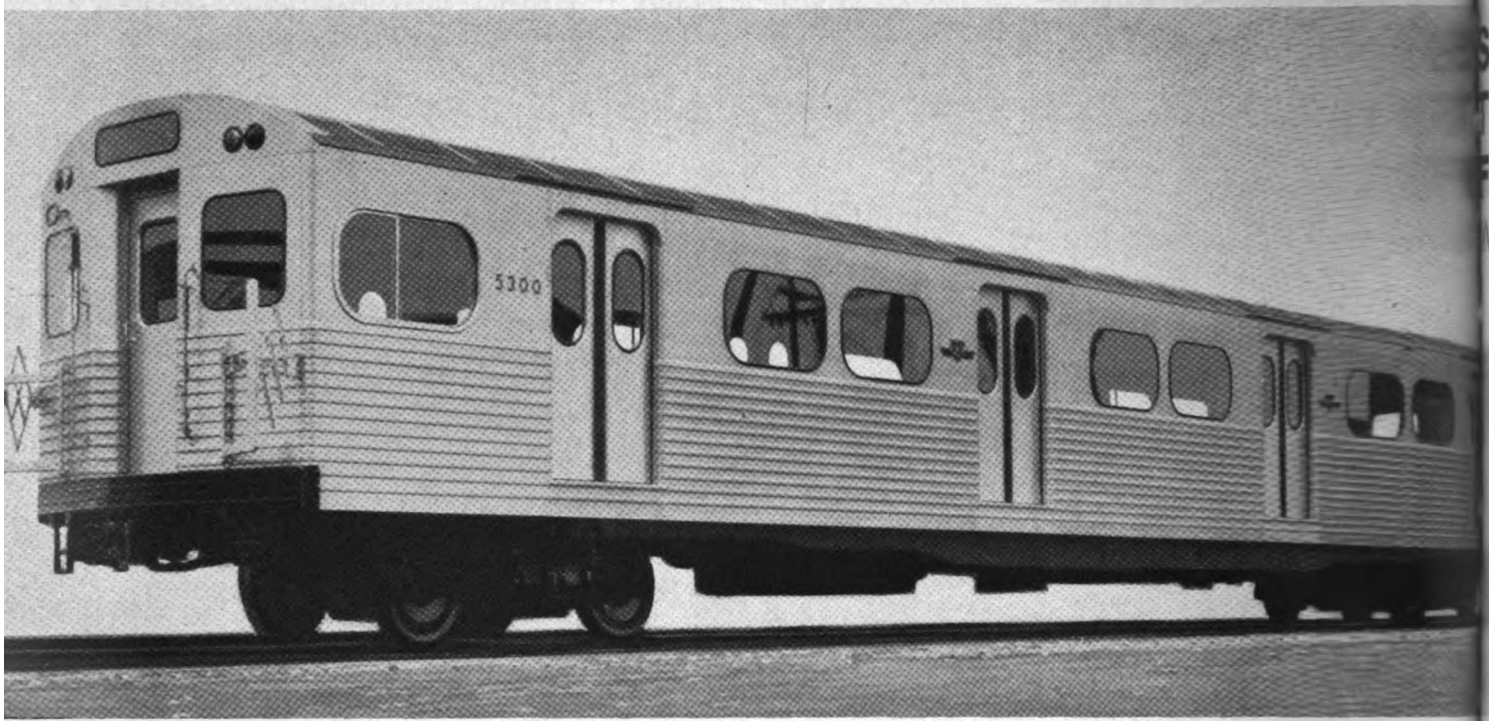
Roller-bearing manufacturers are itally interested in having their bearngs properly inspected and serviced. A typical facility for the maintenance of its AP roller bearings has been established by the Timken Roller Bearing Co. to show railroads what is needed for such periodic attention. The benches and equipment can be arranged in a space of about 30 ft along one or two shop walls.

First unit in this compact shop is the hydraulic platen press (left), used for disassembly of the bearings. Next are a pair of agitating-type cleaning tanks. On the next bench are the cone inspection fixture, with its magnifying glass, and a hose for spraying protective oil on the bearings following cleaning. Just beyond this bench is the lateral checking fixture mounted on a stand 29 in. high.

In the corner is a grease-dispensing unit which supplies the cone assembly greasing fixture on the final bench where bearings are not only lubricated but also assembled. Assembly of the bearing is done with the hydraulic platen press. From the left the line divides into four areas: disassembly, cleaning, inspection, and lubrication and assembly. All equipment is available from commercial suppliers; it would be unnecessary for a road to build anything.



Compact shop incorporates all the tools and inspection devices needed to process the tapered package roller bearings. When other types are handled, and when there is higher production, more elaborate facilities with conveyors and additional tools can be installed.



High-capacity cars are being obtained for service on extension of subway line which is now nearing completion in Toronto.

TTC Cars Are Continent's Lightest

Lowest weight-space ratio is achieved through the use of new construction techniques and lightweight materials

Rapid transit cars with the lowest weight-space ratio ever achieved in North America have just been delivered to the Toronto Transit Commission by the Montreal Locomotive Works. The cars, intended for service on a new line of the Toronto subway to be opened later this year, will be delivered at a two-cars-per-week rate until all 36 units are completed in July.

The new cars are 74 ft $5\frac{5}{8}$ in. over coupler pulling faces and 10 ft $3\frac{7}{16}$ in. over side sheathing. Each is powered by four 125-hp traction motors. Seating is provided for 84 passengers, and standing room brings total capacity to 310. Empty weight of each car is 64,500 lb, and total passenger area covers 730 sq. ft. This compares with the 84,000 lb and 575 sq ft of previous TTC subway cars and represents a reduction of 44% in the weight-space ratio. The new cars not only reduce unit capital costs, but are expected to produce considerable operating savings.

Longer, lighter subway cars have been the goal of the TTC since equipment for its first subway operation was under study in the early 1950's. At that time it was initially planned to use 48-ft cars in 10-car trains. High prices quoted for such equipment resulted in the consideration of longer equipment and finally resulted in the 57-ft cars which are now operated on the Yonge Street Subway in trains of up to eight cars.

The specification for cars now being delivered allowed quotations for longer cars. It was stipulated that the longer cars must be of such size that six of them would have the same passenger capacity as eight of the 57-ft cars. Bids of the successful bidder showed the following comparison of eight short or six long cars per train:

	Weight, lb	Kw-hr per round trip
Eight short cars	409,000	640
Six long cars	369,000	530
Saving, %	9.8	17.2

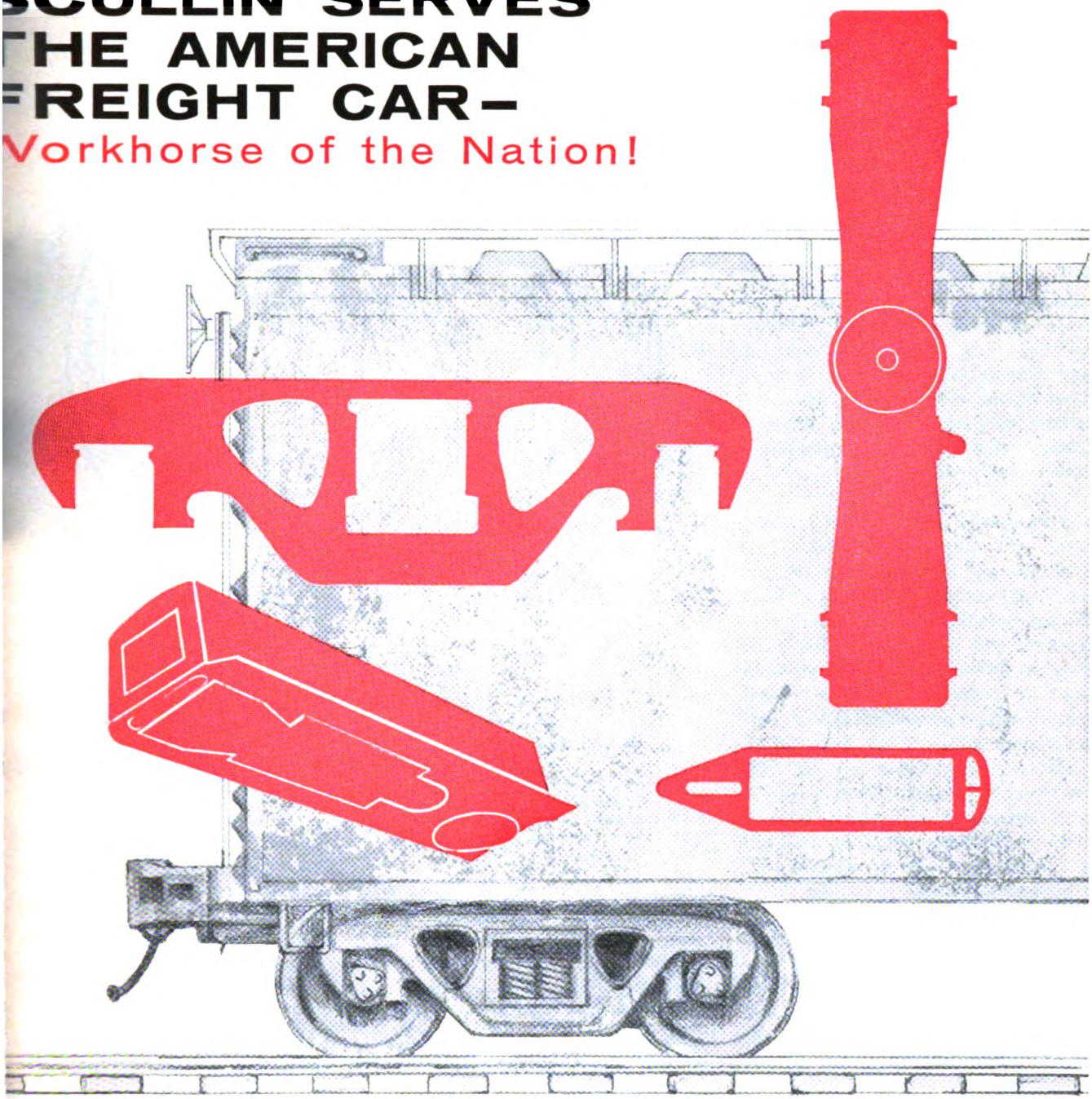
The cars, generally, are built of aluminum alloys and have unpainted exteriors. They are designed to operate in two-car units consisting of one "A" and one "B" car, and trains will be made up of one, two, or three of these units. Each car has a single cab. The "A" car of the unit has the motor-alternator set for lighting and the rectifiers and batteries for the low-voltage d-c system. The "B" car has the motor-driven air compressor. Cars of a unit are joined by a manually operated automatic coupler. Each car has a complete set of traction and braking controls. While the new cars will not couple with the original Toronto subway cars, they are designed so they can be operated on the same schedule in separate trains. This is made possible by selecting a lower performance with a key-operated switch.

Each car has eight pairs of sliding side doors, four on each side. The seating arrangement divides the cars into four distinct areas, one at each pair of doors. Seats are arranged longitudinally and crosswise for two and three passengers. They feature lightweight bases fabricated of patterned aluminum sheet and include louvres for distribution of heated air. A pressure-ventilating system in the monitor

(Continued on page 32)

SCULLIN SERVES THE AMERICAN FREIGHT CAR—

Workhorse of the Nation!



Thousands of freight cars are at work day and night, delivering goods to the industries and the consumers of America. Always vital to our economy, they are even more so in times of national crisis.

Scullin Steel, as a leading manufacturer of Freight Car Truck Side Frames and Bolsters, Coupler Yokes and Draft Sill Castings has played a part in keeping America's freight cars rolling for more than 60 years. When you need the highest quality—with on time delivery—specify Scullin Steel.

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P R I MEMBER

(Continued from page 30)

roof allows windows to be of a fixed type, serving to keep heat losses at a minimum, reduce drafts, cut the noise level considerably, and keep out dust.

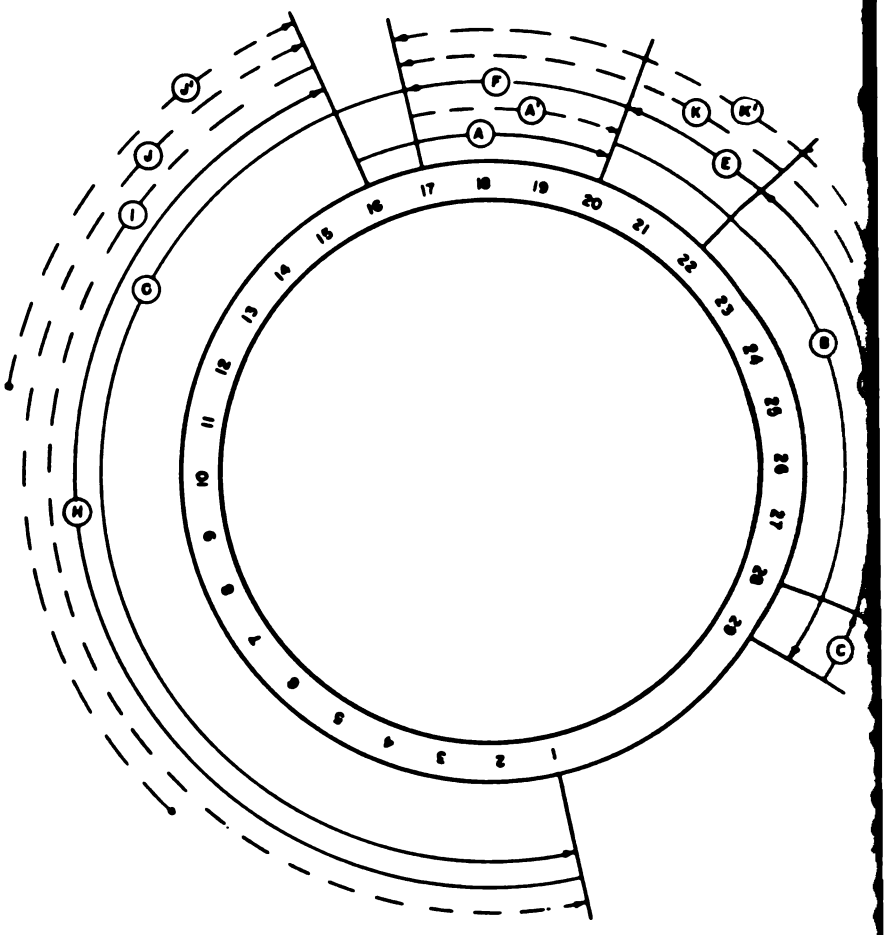
Vinyl asbestos floor tiles are glued directly to the aluminum-faced plywood floor. At walls and seat risers a vinyl cove moulding prevents accumulation of dirt. Sharp corners and inaccessible places have been avoided throughout the car to facilitate cleaning. Interiors involve an absolute minimum of painted surfaces. Predominant colors are light blue, yellow, and light grey. Ceilings and wainscots are of laminated colored plastic, fastened to the car structure with aluminum snap-on mouldings. Window frames are colored thermoplastic, vacuum moulded to shape.

Car Structure

Aluminum alloys used in the car body take advantage of the intricate shapes possible with aluminum extrusions. It is believed that this is the first time that extrusions have been used so extensively in rapid transit cars. Top and bottom rails; door, corner, intermediate, and cab corner posts; exterior louvre frames and trim are typical of the extrusions used. All such extrusions are Alcan 65S-T6 alloy. Each was individually designed to suit the particular application with regard to structural strength, fastening, appearance, and weight. Welding, bolting, interlocking and interference fits were all used as methods for fastening. In calculating stresses, the roof has not been considered as a load-bearing member because of the ventilating louvres which extend the full length of the car.

LAHT steel is used for the underframe end assemblies. These welded units carry the cast-steel center bearings, coupler anchors, side bearings, and anti-climbers. Because these cars have no center sills, end frames are designed to transfer draft and buff loading to the side frames. Underframe crossmembers and equipment supports are also of steel, while the main longitudinal members are aluminum extrusions. End frames, crossmembers, and side sills are joined with Huck bolts, taking precautions against corrosion at the aluminum-steel joints.

Side-frame members are of extruded aluminum alloy joined by welding. Side sheets are applied with Huck bolts having a special low profile head. Side sheets, ⅛-in. thick of Alcan B54S-H21 alloy, have longitudinal corrugations in the sections below the beltrail. Shear buckling strength has been augmented by formed aluminum stiffeners fastened to the inside of sheets by MIG spot welding. Each side sheet is continuous from door to door, or from door to corner post. The unpainted exterior surfaces are brushed at the mill with a rotary stainless-steel brush which produces a finish that has an attractive appearance, can be washed periodically, will not discolor through the design life of the car, and can be refinished if scratched or dented.



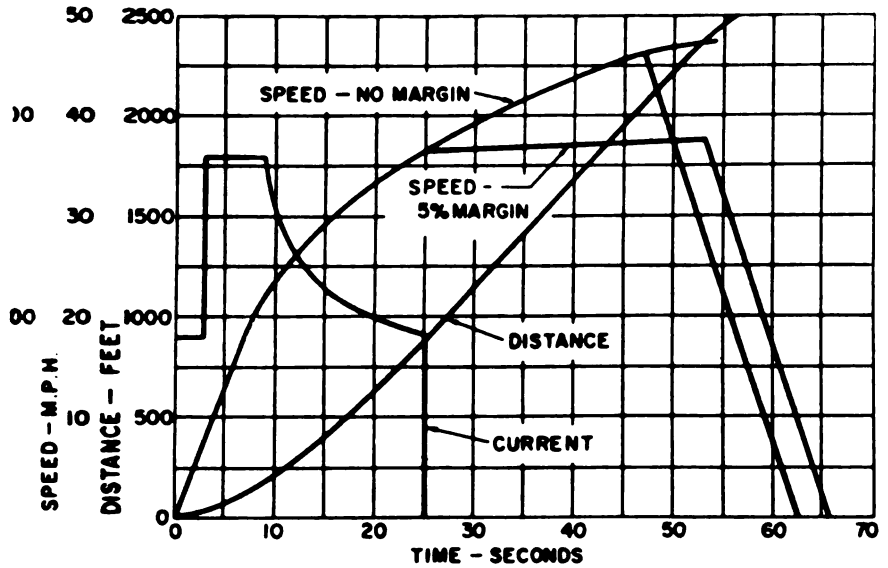
FUNCTION OF NOTCHES		CONTROLLER SEQUENCES	
1-15	Full field dynamic brake	A	Power application after braking
16-17	Shunted field dynamic brake	A	Power application after shut-off
18-19	Reverser positioning	B	Series notching
20-29	Series motoring	C	Series—parallel transition
29-28	Transition	D	Parallel notching
28-22	Parallel motoring	E	Field shunting
21-20	Parallel motoring with shunted fields	F	Power shut-off
		G	Dynamic brake notching
		H	Controller return after braking
		I	Brake notching after release
		J, J'	Brake release, incomplete cycle
		K, K'	Power shut-off, incomplete cycle

Operating positions of traction controller show how single unit establishes circuits for series parallel motoring, field shunting, reversing, coasting and braking. Full operation gives high performance. Low performance to allow new cars to operate with older ones is obtained by energizing relay which stops controller in position 22 instead of 20.

The carlines are riveted to full length extrusions on each side of the roof which are shaped to fit matching extrusions at the top of the side frame. At final assembly, the roof and side frame extrusions are joined with Huck bolts to form an integrated structure. The upper roof, made of Alcan 3S-H18 aluminum-alloy sheet, is pulled over the carlines and spot welded.

Lightweight Motors

High gear ratios, possible with hypoid gearing, allow the use of high-speed, lightweight motors and small diameter wheels. Inboard-bearing truck frames are also used. Truck



performance curves show operating characteristics for 2,750-ft run on downgrade of 0.59 % t total car weight is 100,000 lb. Wheel diameter is 28 in.; gear ratio is 7.14 to 1. Operating ge is 560 volts d-c; total power consumption per car on this run is 2.49 kw hr. Calculations ne complete trip showed power consumption of 530 kw hr for the 6-car train as compared 640 kw hr for 8-car train which was originally planned.

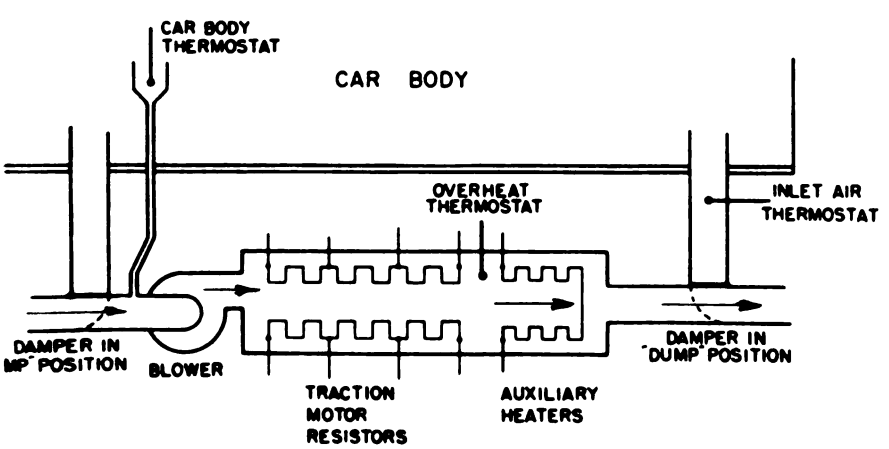
nes and bolsters are of cast steel. nbined coil and air springs support bolsters which are stabilized ver- lly and horizontally with hydraulic ck absorbers.

The spring design must accommo- e two conflicting requirements— intenance of platform height within sonable limits with changing pas- ger load and control of dynamic lection within the tunnel clearance. r weight varies from 64,500 lb pty to 109,000 lb with a full standee d. The conflicting requirements call a low spring rate for a soft ride.

An air bolster spring provides the ution to these problems. Steel coil ings within the air springs are ca- ble of carrying the weight of the pty carbody. These coil springs also vide the bolster lateral restoring ce. To control carbody roll within acceptable limits, it is necessary to have a wide spacing of bolster springs. It is 54 in. on these cars. Two steel coil springs are provided over each journal bearing along with high frequency vibration insulators. Each truck has four package brake units with composition shoes.

On each end of each car are automatic couplers of a hook type with side-mounted electric portions for control circuits and for the 600-volt, 400-cycle lighting current. Couplers also carry two air-pipe connections, one for main reservoir; the other for brake pipe air. At the operating ends, coupling and uncoupling can be remotely controlled from either of the facing cabs. Those on the non-operating ends are manually operated.

The draft gear of each coupler is rubber cushioned. If the 115,000-lb buff load is exceeded, shear bolts release, allowing the couplers and draft gears to move back, so that the anti-climbers engage to carry the load. This is advantageous in rapid transit cars having coupler center lines below the underframe. When draft gears release, the eccentric loading of the underframe is removed with consequent lessening of the tendency to buckle at the coupler anchorage and lessened tendency to derail during collision.



ste heat developed in dynamic braking grids is being used to heat cars. Power cost, first cost, d weight were all considered in making decision to adopt this heating system. System is shown "dump" position when heated air is discharged in tunnel. In heating, air is passed through rbody. Supplemental electric heaters are energized if more heat is needed.

Control System

The SCM simplified cam magnetic propulsion control allows a single controller to establish circuits for series motoring, parallel motoring, field shunting, reversing, coasting, braking, and switching of main resistors in motoring and braking. The cam magnetic switch units permit the same controller positions to be used in parallel and series. Maximum acceleration rate is maintained at 2.5 mph up to 20 mph. The static circuits hold the rate of rise of dynamic braking circuit to a safe value when build-up starts by slowing the controller notching until the proper value of circuit resistance is reached. The air spring system makes it possible to use air signals for load weighing. Transducers, air-operated variable resistors, handle these signals. One is used for load weighing in acceleration, another controls rate setting in dynamic braking.

Control of dynamic and air braking is basically electro-pneumatic. As the dynamic brake fades before the car comes to a stop, the air brake is applied automatically. The electro-pneumatic brake, by means of a coded control system, provides seven equal increments of braking effort in application and release. Braking is subject to load variation, controlled by the pressure developed in the air springs to insure that braking effort of each car is proportional to the total car weight.

The single motor-alternator set furnishes power for the various electrical systems. It is a two-bearing set with four separate rotating machines on one shaft, along with the two blowers used for the car-heating system. To reduce maintenance and improve reliability, static-state electronic control devices and brushless alternators have been used. Only moving mechanical contacts are the d-c motor com-

mutator with its brushes and a signal relay in the control.

The motor in the set is series wound but with a low-voltage control field to maintain speed at 2,180 rpm. The two brushless alternators are of the "Lundel" type having 22 poles giving 400 cps output frequency.

Output of the first alternator provides a two-phase supply at approximately 600 volts to grounded neutral for the fluorescent lights in the two coupled cars. The output of the second alternator is three-phase, which is rectified to provide the low voltage d-c for control and battery charging. The fourth rotating electrical component on the shaft is the brushless exciter with its rectifiers. The stator and rotor of this machine each have four- and six-pole windings to separately supply the fields of the two alternators.

All cables and wiring conform to the latest AAR standards. The conductors are rubber insulated and neoprene covered. The cables underneath the car are run in vulcanized fiber troughs, while the under-car wires are carried in aluminum conduit. Compression type terminals are used throughout.

The side sliding doors are electrically operated and controlled with one operating device per door opening. The second door at each opening is mechanically connected to the first. Each pair of side doors has an electrical interlock switch so connected that all doors in the train must be closed before traction power can be applied.

Heating and Ventilating

Dynamic brake waste heat recovery was selected for heating purposes because extensive study showed a considerable overall saving compared to conventional electric heating. The 3,000 cfm of heated air is carried in ducts underneath the car to the seat bases and emitted into the passenger compartment through louvres. Air is returned through grilles above the side windows and taken down ducts formed by the center door posts.

During heating, this air is recirculated through the resistor box underneath the car. When heat is not required within the carbody, outside air is taken from underneath the car and dumped beneath the car after passing through resistor box. The resistors are arranged in two stacks, each separately blown by two blowers on the motor-alternator set of the "A" car and by a blower with a separate motor on the "B" car. To heat the cars in the yards and to supplement waste heat if required, the accelerating and braking resistor compartment also contains two auxiliary heaters of 12 kw each.

Passenger comfort is protected by an inlet air thermostat which measures the temperature of the hot air being delivered to the carbody. When comfortable levels are exceeded, the heated air is dumped as in summer operation, even though the carbody thermostat may be calling for heat.

Ventilation of the car in summer is accomplished by five overhead axial flow ventilating fans, with a total capacity of 15,000 cfm. This capacity exceeds that required for adequ ventilation, but the object is to prov a noticeable turbulence to cool passengers.

Lighting is provided by two c tinuous rows of fluorescent lig powered by the two-phase, 600-v 400-cycle supply from the motor ternator set of the "A" car. This t of lighting is advantageous becaus its high efficiency, light weight, high level of general illumination.

Short third rail gaps do not in rupt the fluorescent lighting becaus the mass of the rotating portion of motor-alternator set. The light power is transmitted through couplers from the "A" to the car. Emergency lighting is batt powered.

Rubber Suspension Cuts Impact

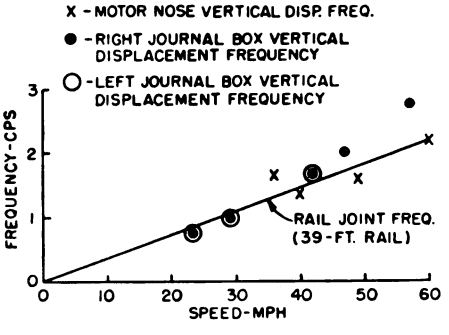
(Continued from page 20)

ent on test records, and the amplitude proved to be a good measure of the condition of the roadbed.

The next higher frequency component of motor-nose acceleration also varies with locomotive speed. These frequencies indicate a disturbance closely approximating a frequency corresponding with every 2 ft of locomotive forward motion. This distance coincides closely with cross-tie spacing on the particular railroad where the tests were conducted.

A high-frequency vibration, consistently corresponding to frequency of gear-tooth meshing, is always present in the accelerometer readings. Separate tests have been made on this aspect, showing that the magnitude of these high-frequency vibrations increases rapidly with deterioration of gear-tooth profile.

There is only limited data on the service life of various suspensions. Four different types were tested for 1 yr 9 mo on the same locomotive on a



Vertical displacement of motor nose and journal boxes can be correlated with rail joints. Low frequency sustained vibration has been found to vary directly with locomotive speed.

U.S. railroad. Two types of ste spring suspensions—one standard a one highly preloaded by shimming and two types of rubber suspensio were tested.

It was learned from these tests th if the preload in the motor nose asse bly is too high, there will be rap wear of the steel wear plates. Sin motion must take place between t traction motor and truck, wear m occur. If this motion takes place und high load, wear is accelerated.

Height of the rubber is importa Two different types of rubber-st sandwich suspensions have been us in service. Overall height of one 7½ in.; of the other, 5⅜ in. Difficul has been experienced with buckling the higher one. In some cases, this h led to failure of the steel plates a damage to the rubber.

The rubber suspension will take permanent set corresponding to proximately one third of the origi preload. While allowance can be ma for this when establishing preload, cannot be fully compensated. Sim tests indicate that a small amount backlash is not detrimental, this advantage is probably small.

The tests indicated the advanta of a rubber suspension. While the of rubber is not absolutely necessa it does have two most desirable cha acteristics—a non-bottoming feat and a high damping coefficient. No linear volute springs with fricti damping have been considered a tested. One drawback is that the fr tion damping may change with wa

ypical Days With Doc Watts

Gordon Taylor

t month Fred, an electrician, asked v the a-c system on diesels had no s like the d-c system.

"You're one of the first fellows ever sk me about that," answered Doc. three-phase induction motor is y reliable as long as all three wind- s remain connected to the three- se power source. But should one he power wires become open, as in case of a blown fuse, look out; that tor is in real trouble. If the open se occurs while the motor is run- g, the motor will continue to run will overheat very badly. If it con- ues to operate under full load, the dings will soon be roasted. If one se opens when such a motor is nding still, the motor will not be e to start and would also overheat.

"Three-phase motors used in fac- ies and shops are usually located ere someone would see them or r them 'humming' in case they are gle phased.' On a diesel locomo- e these motors cannot be closely ob- ved because of the noise in the gineroom and because the engine- n is behind a closed cab door.

"It is more practical to connect the motors directly to the alternator hout fuse protection. I have known but one case where we had a-c tor failures on a locomotive be- se of single-phase operation. That curred several years ago when a e broke at a terminal lug. In that e, we had to have two blower tors rewound. It's a better risk to e no overload protection than to damage by single-phase operation t would result from a blown fuse. es that answer your question?" ed Doc.

"It does, indeed," said Fred. "Why a-c motors used instead of d-c tors on these blowers?"

"They have several advantages," c replied. "They are simple and ged. There is less maintenance be- cause they have no brushes, brush- holders, or commutators. They have a natural speed control that works well in this service. The a-c motor speed increases directly with the frequency of the alternator. The alternator fre- quency is directly proportional to the diesel engine speed. When the engine operates at full speed to meet heavy load requirements, the blower motors automatically operate at their full speed to give maximum cooling for traction motors and engine radiators.

"I hope I've answered your question fully. Now I must go to the office."

As Doc walked across the shop, another maintainer stopped him. "We have a traction motor that we would like you to look at. We just installed a pinion and there is some question as to whether we have made a good job of it. I know you've been working with these things since the days of the gas- electric cars, so come over and take a look at this one."

As they stopped at the motor, Doc could see that the pinion was still hot, having just been applied with the in- duction heater. "We have a standard instruction covering the application of these pinions," he said. "It tells you the proper temperature for heating and the distance that the heated pinion should be advanced on the tapered end of shaft. I mean the distance the heated pinion advances past the point where it could be placed on the shaft when it was cold. What does the 'ad- vance gage' show? Did you set the pinion the recommended advance dis- tance? Our instruction calls for a minimum advance of 0.050 in. and a maximum advance of 0.060 in. An ideal advance is 0.055 in."

"The pinion must have been hotter than we thought," said Bob, "for we find its location is 0.065 in.—0.005 in. past the recommended maximum ad- vance point. Now what do we do? Some of the fellows think we should let it alone because it is an extra-tight fit."

"I'm glad you asked about this," said Doc. "If the pinion is now past the recommended maximum advance limit, it must be removed and reap- plied. There can be danger in getting pinions too tight as well as in setting them too loose. Pinion mounting is a very particular job that requires ex- treme care.

"You may be interested to know that on the older gas-electric cars the traction motor pinions and shafts were fitted with keyways and a metal key secured the pinion to the tapered shaft. A threaded nut was tightened against the outside end of pinion to further secure it in place on the shaft. Later, when we received some 400-hp gas- electric cars (with two 200-hp motors), we found one day that the motor pinion had no key or keyway. In alarm, we called the General Elec- tric service engineer and he also thought some mistake had been made at the factory. When he checked, he found that the new method—a drive with a shrink-fit pinion on a tapered shaft—was better than a steel key when properly done.

"When we got diesel locomotives, they, of course, came with shrink-fit pinions. Experience with our first die- sel switchers showed that pinions could be advanced too far on the shaft, setting up internal stresses in the pin- ions which caused them to break, pro- ducing expensive motor failures. For that reason, it is highly important to follow the manufacturers' recommen- dations for pinion mounting. I'm glad, Bob, that you decided to check with me the question of remounting this pinion. By so doing, you no doubt prevented a future diesel failure and train delay."

"I really hated to bother you," said Bob.

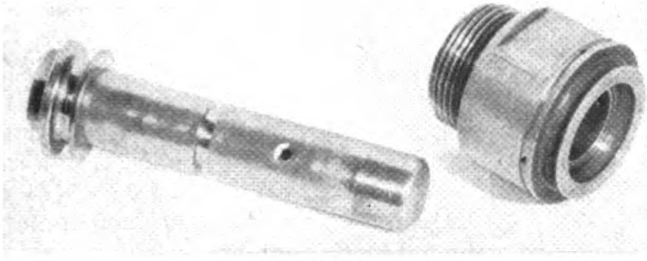
"Think nothing of it," Doc replied. "I would rather answer questions that will prevent failures than to try to ex- plain a failure that could have been prevented. Now I must get back to the office to look over some trip reports that may contain clues that will enable us to prevent other failures."

Now a word to enginemen. In sports, the effectiveness of a team can depend on signals between its mem- bers. In railroading, the effectiveness of the diesel team depends largely on the 'trouble signals' contained in en- ginemen's trip reports. Enginemen, please pass signals to the maintainers with carefully prepared reports.

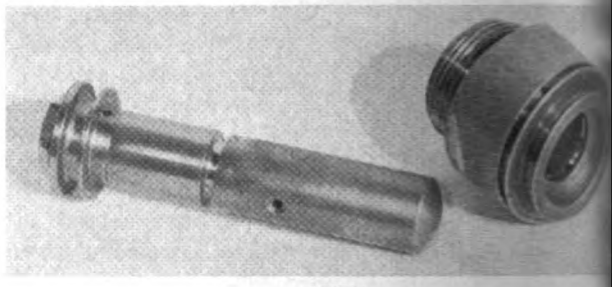
series of articles is based on actual experi- s of men who operate and maintain diesel- ric locomotives.

Diesel Repair Time Savers

Modification of Bell-Ringer Cartridge



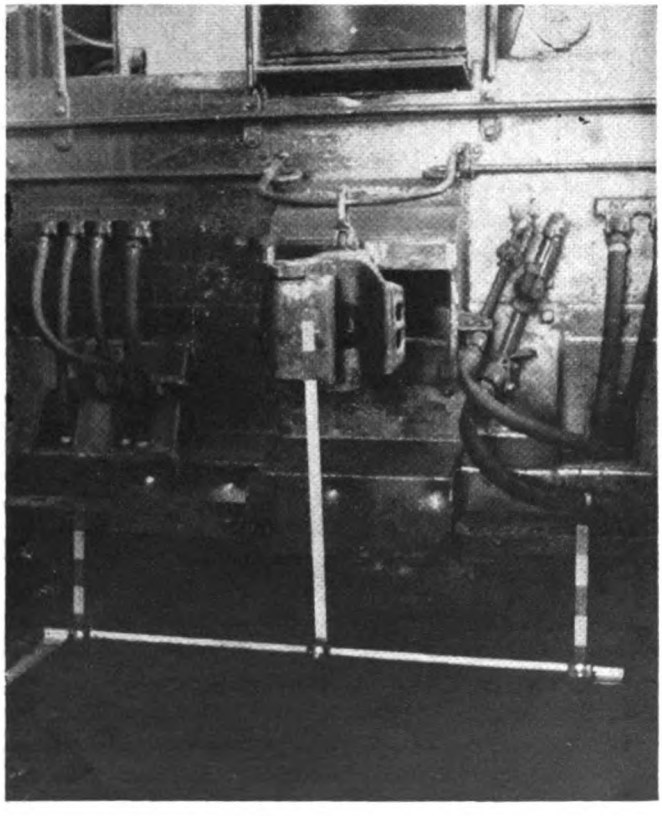
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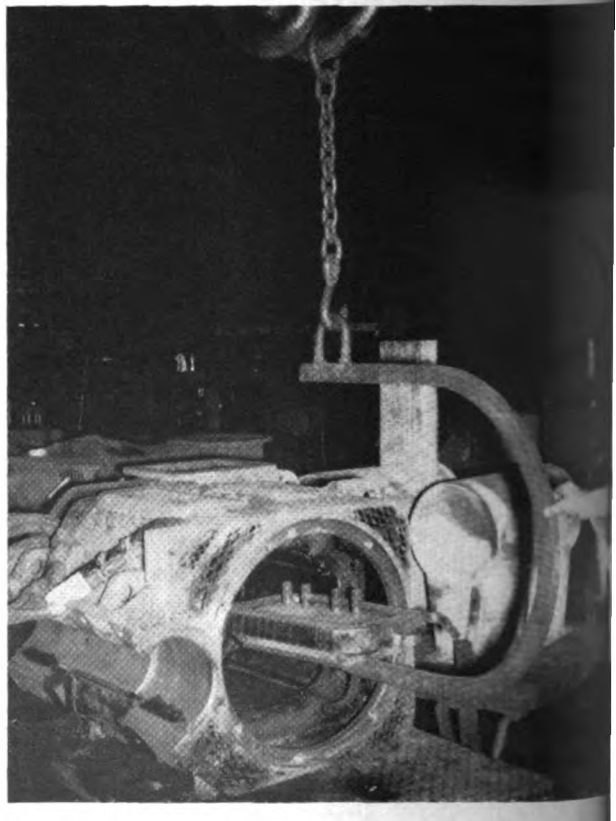
Reclamation and modification of the pneumatic bell ringer is an example of the work done on diesel locomotive parts by the Louisville & Nashville at its South Louisville, Ky., shop. Old ringer parts can be used most of the time. Cost of labor and material is about $1.10 per cartridge assembly. To modify the assembly which is used on the ringer, two operations are performed. First, the holes in the piston are plugged and a new $\frac{1}{16}$-in. diameter hole is drilled 1-$\frac{9}{32}$ in. below head. Then the cartridge lower body has four additional $\frac{1}{16}$-in. diameter holes drilled between the four original holes in the lower end. A groove $\frac{1}{16}$ in. wide and $\frac{1}{64}$ in. deep is undercut over these eight holes on the inside diameter of the body.

Coupler and Step Gage



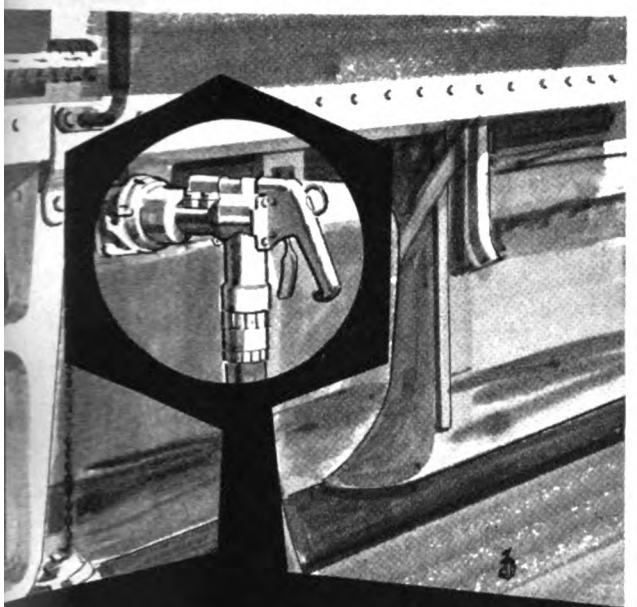
A gage for checking that heights of couplers and pilot steps above the rail meet ICC requirements has been developed by the Wabash at its Decatur, Ill., locomotive repair shop. The tubular base has feet on both ends which rest on the rails. When the folding arms are raised upright, alternate white and red blocks provide a ready check of clearances.

Positioning Device



To avoid damaging traction-motor coils during removal and replacement, a positioner is used by the Illinois Central at Paducah, Ky., shop. The motor frame is rotated so that the load is always applied at the top. The coil is balanced when the device is lifted by overhead crane. Bar stock 1½ x 2 in. is bent into 32½-in. wide U-shaped form.

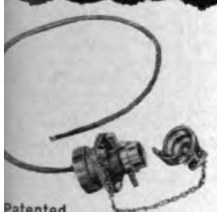
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Report

(Continued from page 5)

The parameter upon which to base a control is a speed-error system. The matter of sensing accurate values of velocity brings in problems of progressive change in wheel size and wheel slip. Tests showed that demands for very low controlled speeds can be met satisfactorily without overheating of traction motors. To the present time it has been virtually impossible to obtain shock data for each car in a long train.

The problem of locomotive vibration could become serious if electronic and servo control with their attendant refinements were to be damaged or rendered inaccurate in normal service. Problems being studied include rotary unbalance of the engine-generator, longitudinal excitation produced by the engine firing order, transverse "hunting" of wheels on the rails, and vertical excitation produced by rail joints.

E. Wynne, vice-president, Great Lakes Region, Canadian National, has succeeded W. M. Keller as chairman of the ASME Railroad Division. Mr. Wynne was formerly system chief of motive power and car equipment, CNR.

At the concluding session of the meeting, it was announced that next year's Railroad Conference, to be sponsored by the ASME and the AIEE, will be held at Atlanta, Ga., during April.

Reading Receives First GP-30 Units

Seventeen railroads have placed orders for more than 600 GP-30 locomotives since Electro-Motive unwrapped its new motive-power unit last fall (RL&C, Nov. 1961, p 17). In Philadelphia recently the first GP-30 production model was formally turned over to the Reading which has ordered 20 of these 2,250-hp units.

Among those present at the trackside ceremonies were R. L. Terrell, vice-president of General Motors and general manager of EMD, and Reading President E. P. Gangewere.

Mr. Terrell called the 2,250-hp GP-30 "the finest piece of motive power we of Electro-Motive have ever built." He noted that the 20 new units which Reading is acquiring will replace 20 FT units which EMD delivered to the road in 1945.

The FT locomotive, said Mr. Terrell, "wrote a thrilling chapter in U.S. railroad history," but "the GP-30 sets new standards of performance, operating economy and efficiency. . . . The old FT locomotive, great as it was in its day, is as obsolete today on U.S. railroads as the steam engine it replaced at the end of World War II." He went on to say: "I can state most emphatically that, proud as we are today of GP-30, some future locomotive . . . will doubt make the GP-30 just as obsolete

Accepting the unit, Reading Presi Gangewere said the road's purchase of GP-30's "is indicative of our efforts to prove our physical plant, permitting Reading to perform faster, better servi He commented, however, that such help measures alone will not return roads to prosperity. They must be augmented he said, by "a sound national transportation policy."

Orders and Inquiries for New Equipment

Placed Since Closing of April Issue

Freight-Car Orders

ATLANTIC COAST LINE.—*Pullman Standard:* 50 90-ton covered hoppers. Approx. cost, $800,000. For delivery this month.

CANADIAN NATIONAL-CANADIAN PACIFIC.—*North American Car:* 40-tri-level automobile rack cars. Leased from NITX Division, North American.

CANADIAN PACIFIC.—*National Steel Car:* 100 50-ton box cars equipped with 8-ft sliding and 8-ft plug-type doors; 100 65-ft, 70-ton gondola cars. *Marine Industries:* 100 70-ton covered hopper cars. Gondola cars and covered hoppers to be equipped with roller bearings. (See also Canadian National.)

CHICAGO GREAT WESTERN.—*Thrall Car:* 5 70-ton capacity covered gondola cars. For delivery this spring.

FRISCO.—*ACF:* 25 100-ton aluminum Center Flow covered hopper cars, equipped with roller bearings. Cost, approx. $500,000. For July delivery.

GREAT NORTHERN.—*General American:* 50 23,000-gal tank cars. For June-July delivery. *Pullman-Standard:* 40 90-ton covered hopper cars. For delivery this month. *ACF:* 10 90-ton aluminum covered hopper cars. For July delivery. *Company shops:* 15 30-ft, all-steel cabooses, electrically lighted and equipped with train radio. Cost, $20,000 each. Completion expected July 1.

NEW YORK CENTRAL.—*ACF:* 50 70-ton Center Flow covered hopper cars. Approx. cost, $625,000

NORTHERN PACIFIC.—*Pacific Car & Foundry:* 24 50-ft insulated box cars equipped with roller bearings and cushion underframes. Approx. cost, $450,000. For July delivery. *Company shops:* 300 50½-ft, roller-bearing, 15-ft double-door box cars. Cost, approx. $9,750 each. Scheduled for completion about August 1.

SEABOARD.—*Thrall Car:* 10 70-ton gondola cars with adjustable bulkheads and removable steel roofs. Approx. cost, $165,000. For June deli

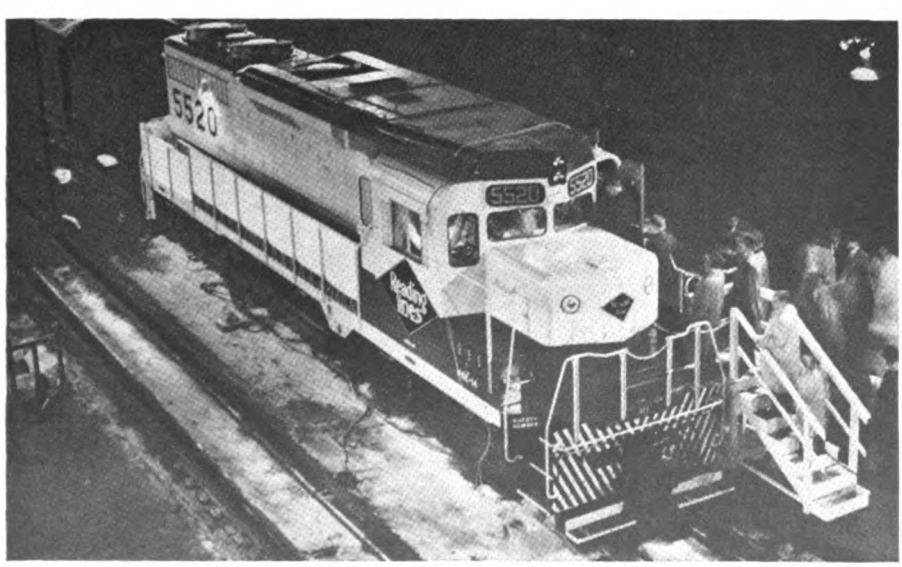
SHIPPERS CAR LINE.—*ACF:* 41 tank c 9 70-ton covered hopper cars; 2 100-ton co hopper cars.

SOUTHERN.—*Pullman-Standard:* 300 box c 70 70-ton insulated box cars. Cost of insulated cars $1,452,150. For May 9 delivery. *Magor* 100 aluminum covered hopper cars. *Thrall* 7 rack cars. Due to printshop error, these or were announced in the April issue as having placed by the Southern Pacific, with Green Steel receiving an order for "500 70 70-ton i lated box cars."

Notes and Inquiries

The *Long Island* plans to acquire at least possibly 60, m-u commuter coaches from Pullm Standard through the assistance of the New Y State Railroad Equipment Program administe by the Port of New York Authority. The cars be similar to the New York Central cars descri on page 17 of the April issue.

The Southern Pacific's $69 million equipm program for 1962 includes the acquisition of 2 new freight cars, 100 mail and express cars, 64 diesel-electric locomotives. The freight cars include 500 open hopper cars; 290 covered h pers; 108 gondolas; 77 piggyback flat cars; Hydra-Cushion flat cars for moving fragile ai ments such as rocket and missile components 1,958 70-ton, 50-ft box cars—500 double door, es cially suited for mechanical loading; 443 insul Hydra-Cushion cars with load protection devi 315 insulated Hydra-Cushion cars with inte bulkheads and staggered doors to facilitate m chanical loading; 200 sliding and plug door Hyd Cushion cars; 200 insulated Hydra-Cushion c with load-protection devices and strengthened derframes, and 300 cars for which specificati are not completed. Three hundred piggyback cars will also be acquired by Pacific Fruit Expr (jointly owned by Southern Pacific and Un Pacific) for handling perishables.





First production GP-30 displayed at Philadelphia. During ceremony E. P. Gangewere, Reading president (in cab), took delivery from R. L. Terr

;N Ordering
)-Ton Hoppers

uipment for a new coal train capable operating in daily turnaround service veen a mine and a washing plant nearly miles apart is being ordered by the isville & Nashville. Using 100 high-acity, self-unloading and self-cleaning per cars (RL&C, April 1962, p 22) the train will be capable of doing the work 00 conventional hoppers. Daily delivery 0,000 tons of coal will be made.

n announcing L&N's decision to buy specially designed cars, prototypes of ch have been recently tested in road ice, L&N President W. H. Kendall said, : believe this represents a significant ukthrough in rail transportation econom-The train we are ordering will require yard handling, give better utilization of pment and conserve motive power, as as reduce delivery time."

he car order follows studies and ex-ments during which the L&N built and ed one 100-ton self-unloading car and icipated with two manufacturers—man-Standard and Ortner Co.—in de-ping two additional experimental cars. Our experience with these cars," Mr. dall said, "has encouraged us to place rder for 100 cars which will be used to ver coal from the United States Steel p. mine at Lynch, Ky., to the steel com-y's washing plant at Corbin, Ky. We e to have the first cars ready for delivery in six months."

he L&N cars will be of steel construc-, using high-strength alloy steels. These y steels, with yield strength up to ,000 lb per sq in., will permit light weight struction at a realistic cost, according to road.

or maximum utilization, new methods oading and unloading are under study. : method L&N has tested experimentally es use of an electrical contact to acti-: the hopper doors, both for opening and ing. Whether electrically or mechanical-ontrolled, unloading can be accomplish-without stopping the cars. The experi-ital models have been unloaded in less 1 30 sec.

lthough not described as an "integral" n, the L&N's new train will have many he features that have come to be asso-ed with the integral train. The cars will pably operate most often as a train.

egral Trains
Get First Tests

t defiinite proposal for the operation n "integral train" has been made by the nsylvania. Involved will be a twice-a k movement of a 70-car train handling 0 tons of coal from a western Penn-ania mine to the Martins Creek, Pa., t of Pennsylvania Power & Light Co. he integral train concept has been under y by eastern railroads for the past two s, and a consulting firm is expected to ent them with a final engineering report he subject shortly. The train has been ued with new vigor in recent months owing the proposal to build long-dis-e coal-slurry pipelines and an Ohio

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THE Improved GRIPCO
BRAKE BEAM SAFETY SUPPORT

Now available for Box Weld Beams as well as other A.A.R. approved Brake Beams–Surprisingly low in both first and maintenance costs, the GRIPCO Brake Beam Safety Support has *again* been improved to provide:

A special new #60 Hanger Casting for Box Weld Beams. (This new #60 Hanger Casting is in addition to the #57 Hanger Casting which is applied to other approved A.A.R. Brake Beams.)

OTHER ENGINEERING IMPROVEMENTS

1. One design fits both 5'-6" and 5'-8" wheel base trucks.
2. One rod length and one spring length. One interchangeable casting fits both spring plank and spring plankless trucks.
3. IDEAL FOR INTER-CHANGE REPAIRS AND RE-BUILT CAR PROGRAMS. New design permits easy and fast applications under all conditions. Nuts need not be removed to apply or remove the support. Jacking of car unnecessary.

SPECIAL FEATURES

1. Designed for spring plank and spring plankless trucks.
2. Supports the brake beam in the event of brake beam or hanger failure.
3. Holds brake beam in horizontal position.
4. Holds brake shoes in proper position in relation to the periphery of the wheel.
5. The brake release feature pulls the brake shoes away from wheel contact instantly when brakes are released.
6. Prevents unnecessary wheel and shoe wear caused by dragging brake shoes.
7. Brake beams, rods, and levers are held in position under spring tension thus reducing false movements, chattering, and wear of hangers, hanger pins, and brake heads.
8. Inter-change application of GRIPCO Support a billable repair (see A.A.R. Code of Rules). 3137

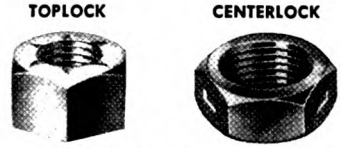
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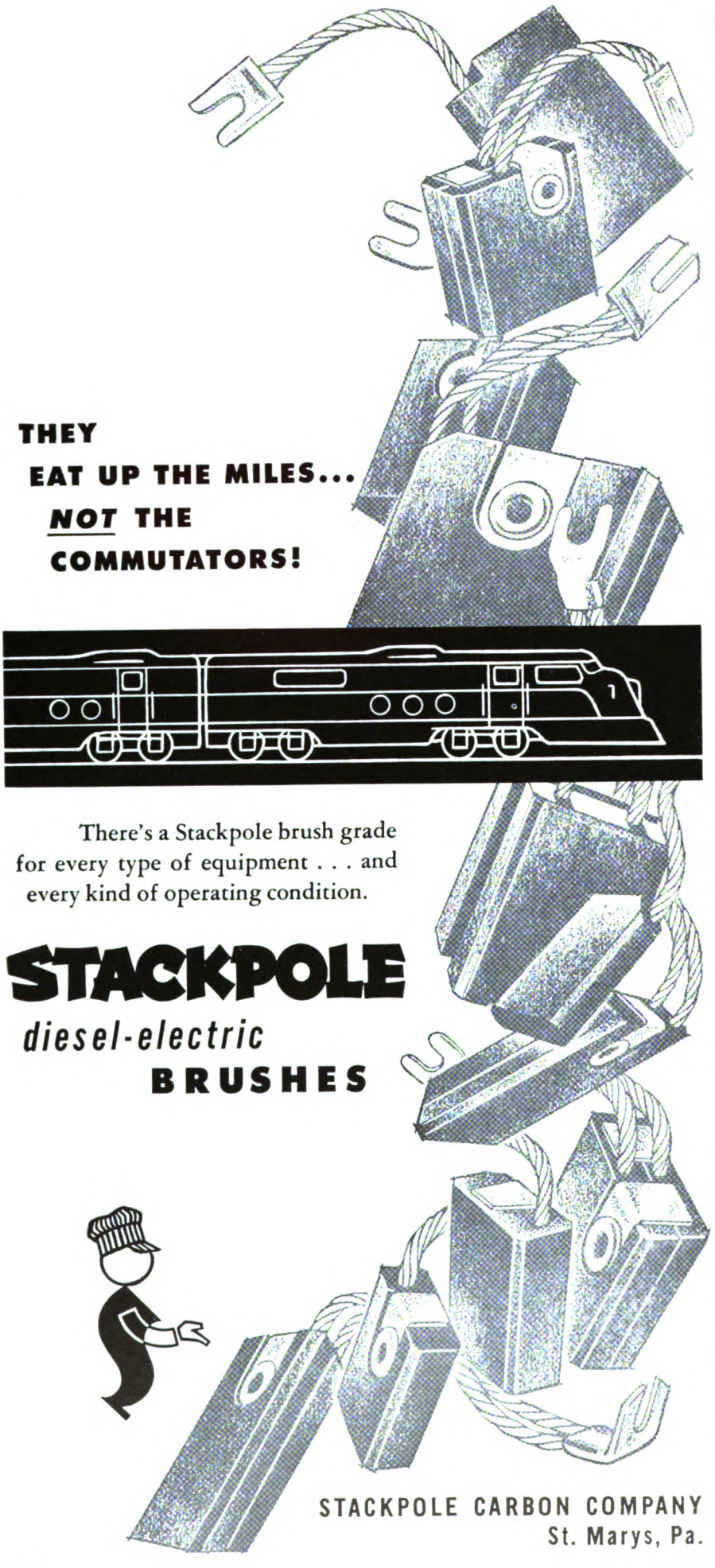
Both nuts available square or hexagon—free spinning.

TOPLOCK | CENTERLOCK



These two lock nuts are appropriate for brake and other safety devices for railroads.

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BRUSHES

STACKPOLE CARBON COMPANY
St. Marys, Pa.

River-Lake Erie canal. Semiperman coupled groups of high-capacity cars, motive power units dispersed throug the length of the train, would handle volumes of bulk commodities, both and liquid, between origins where faci for fast loading have been installed destinations where there are fixed faci for rapid unloading.

A. J. Greenough, Pennsylvania presi has predicted fast-moving developm toward integral trains. These trains, in numbers, would not only shuttle betw mines and power plants and between fields and refineries and consuming cen but could be moving back and forth over the country carrying all kinds of commodities in great volume on fast, interrupted schedules and at low cost said. "With this new transportation too can not only haul these commodities fa and at lower cost, but we can make poss the development of many new channel commerce in areas and for commod not adaptable to present facilities.

"We propose, in the service to the P sylvania Power & Light Co., to cut the per ton on the movement of coal f western to eastern Pennsylvania by $ under the present temporary rate, and $1.26 under the normal rate," Mr. Gr ough said. He pointed out that the very rate can be offered by reason of the stantial economies which come to the road as a result of this type of operat the cooperation of all concerned, and fact that the power company will own cars to be used.

"Hauled by powerful diesel-electric lo motives, train units of large capacity, he duty gondola cars of modern design not be yarded or switched en route and be especially maintained for the servic Mr. Greenough said. "Newly designed cilities at the mine and at the power pl will speed up loading and unloading time provide for storage in volume. The tra will be loaded at the mine in three hou "This 'flexible fuel line on rails' . . . sho beat coal pipelines in every factor of serv and economics and sound the death kn to the grandiose plans being made in so quarters to take almost half the railroa coal business away from them." One of great advantages of the integral train shippers, railroads, and the general pub is the fact that it preserves the railroads common carriers for general public Unlike the proposed coal pipelines, the r roads can have, with the profitable ope tion of integral trains, the money to spe in service and facilities for shippers in g eral, especially small producers wh volume may be in carloads rather th train lots. "All of this, too, means the p servation of railroad jobs and eventua I believe, a very substantial increase in r road employment throughout the countr Mr. Greenough said.

In addition to the PRR proposal, wh will require ICC approval and a time involved in the acquisition of the spe equipment, it is expected that the New Y Central will initiate an experimental op ation with conventional equipment summer. To be tested will be the moveme of iron ore from the Lake Superior regi to the Pittsburgh district.



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Air-Push Jumbo Rotary Seal Windshield Wiper Motor—"standard" of the industry.



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AR Mechanical Division ets June 26, 27, 28

1962 meeting of the AAR Mechanical ision will be held at the Hotel Sherman, cago, on June 26, 27 and 28. W. T. , president of the Atlantic Coast Line, be the speaker at the session on Tues- June 26. J. W. Hawthorne, ACL chief hanical officer, is currently chairman he Mechanical Division.

peaker for the June 27 session will be H. Zimmerman, vice president (opera- s), Illinois Central. K. H. Tuggle, mem- of the Interstate Commerce Commis- , is scheduled to speak on June 28. The quet, sponsored by the Railway Electri- and Mechanical Supply Association, be held on June 27.

n compliance with an economy directive he AAR Board of Directors, only a lim- business session was held by the Me- nical Division in 1961. Because this r's meeting will be open, F. Peronto, cutive vice chairman of the Division, icipates much larger attendance. Dur- the three days, reports will be presented sixteen committees—General, Nomi- ing, Arbitration, Prices, Car Construc- , Brakes, Couplers and Draft Gears, ading Rules, Locomotives, Safety Appli- es, Specifications, Tank Cars, Wheels Axles, Lubrication, Journal Roller arings, and Electrical Equipment.

rn-Off Damage Is Lower

eliminary figures for 1961 "for the first e in many years" show a decline in the nage resulting from burned-off journals rolling stock, W. M. Keller, AAR vice sident—research, reported recently. mage total for all railroads is given as) million as compared with $14 million 1960. These complete axle failures fol- v overheating of bearing assemblies.

Journal performance for January 1962 ntinued at the same high level achieved ring the closing months of 1961. Latest ures from the AAR Mechanical Division owed an average of 728,992 miles per hot x set off between division terminals. Av- ges of over 1,000,000 miles per hot box re reported by 29 railroads. On Decem- r 31, 1961, there were 1,762,240 freight s equipped with lubricators—85.5% of al fleet and up from 65.3% in 1960.

Letter to the Editor

"Another Way"

TO THE EDITOR:

The editorial entitled "Another Way" in the March 1962 issue of Railway Locomotives and Cars is receiving some criticism from at least a few railroad electrical department men involved in fixed-property electrical matters, for two reasons:

First, it indicates that the work of the former Electrical Section of the Engineering and Mechanical Divisions, AAR, has been assumed alone by the Committee on Electrical Equipment—Rolling Stock, of the Mechanical Division. The fact is that the Committee on Electrical Equipment—Rolling Stock, took over only the rolling-stock aspects of the work of the former Electrical Section, and that Committee 18—Electricity, AREA, was reestablished to take over all of the fixed—property aspects of the work of the former Electrical Section. Incidentally, Committee 18 has been functioning aggressively under nine subject assignments, several of them with a number of subassignments.

Second, those from whom I have heard with respect to the editorial definitely do not agree with the suggestion that the Land Transportation Committee of the American Institute of Electrical Engineers should or could adequately take over the work of the Committee on Electricity—Rolling Stock, Mechanical Division, AAR, and of Committee 18—Electricity, of the AREA.

I shall not at this time go into the reasons which these men have advanced for this feeling, but do write you this letter upon the request of one railway electrical department man, a member of AREA Committee 18, who has requested that I bring this matter to your attention.

Neal D. Howard
Executive Secretary,
American Railway
Engineering Association

Personal Mention

Chesapeake & Ohio.—*Huntington, W.Va.:* CHARLES O. BARNETT, foreman boiler shop, appointed system boiler inspector, succeeding R. I. GOWDY, retired. *Russell, Ky.:* C. R. HITE, foreman smith and contstruction shop, appointed engineer of fabrication. *Grand Rapids, Mich.:* WILLIAM J. LOCKHART, assistant engineer, locomotive department, appointed assistant shop scheduling engineer. *Clifton Forge, Va.:* J. N. ANDERSON appointed car lubrication inspector.

Chicago & North Western.—*Marshalltown, Iowa:* Now headquarters of H. K. COX, master mechanic, formerly at Clinton, Iowa, and E. R. STANDING, division general foreman, formerly at Cedar Lake, Minn. *Clinton, Iowa:* J. H. BELCHER appointed division general foreman.

Monon.—*Lafayette, Ind.:* E. E. KAUFFMAN, superintendent motive power and equipment, retired. C. D. HANER, supervisor diesel locomotives, appointed general superintendent, mechanical department.

Pennsylvania.—*Philadelphia, Pa.:* RICHARD E. FRANKLIN appointed director, industrial engineering. Mr. Franklin formerly assistant vice president—mechanical, Southern, and later vice president in charge of manufacturing, engineering and spot car repair systems for Railway Maintenance Corp.

Pittsburgh & West Virginia.—*Pittsburgh, Pa.:* W. K. KEARNS, chief engineer and chief mechanical officer, appointed vice president—operations and maintenance. J. H. LAWRENCE, assistant to vice president—transportation, appointed assistant to vice president—operations and maintenance.

Reading.—*Reading, Pa.:* F. R. ELLIS appointed superintendent of safety and air-brake instruction. Position of general air brake instructor abolished.

Southern.—*Atlanta, Ga.:* HUBERT E. WARREN appointed system general road foreman of engines. SHERMAN P. HICKS, JR., appointed general foreman. *Knoxville, Tenn.:*

ERNEST C. WILSON appointed general road foreman of engines, succeeding Mr. Warren. GORDEN F. FISHER appointed quality control engineer, and JOSEPH N. TODD, JR., production and material control engineer, Coster shop. *Hayne Shop, Spartanburg, S.C.:* HARVEY L. UNDERWOOD, JR., appointed tools and methods engineer; TROY L. PUCKETT, junior process engineer; SALVATORE SERVIDIO, quality control engineer, and RONALD T. BINNER, production and material control engineer. *Hattiesburg, Miss.:* MURRY C. PAYNE appointed road foreman of engines. *Birmingham, Ala.:* JOHN I. VARDAMAN, JR., appointed road foreman of engines, succeeding Mr. Payne.

OBITUARY

Frank M. A'Hearn, formerly master mechanic, Bessemer & Lake Erie, died March 14 at age of 85. Mr. A'Hearn retired in 1947 after 52 years of service.

F. H. (Ham) Hardin, 75 formerly assistant to president—mechanical, New York Central, and president, Railway Wheel Association, died March 21 at his home in Sea Island, Ga.

Joseph W. Tragnitz, 62, general master mechanic, Illinois Central, Chicago, died on March 29.

Supply Trade

B. F. GOODRICH CO. — A $1 million program under way at Akron, Ohio, to modernize departments which produce hose of all types for use in transportation and other industries.

■

BUCKEYE STEEL CASTINGS CO.—*David D. Macklin* appointed chief mechanical engineer, Product Engineering Dept., Columbus, Ohio, succeeding the late *Dr. James C. Settles.*

■

SILENT HOIST & CRANE CO.—*Bowman Supply Co.*, 75 Public Square, Cleveland 13, Ohio, appointed sales representatives to railroads serving Ohio, Michigan, Virginia and relevant areas.

■

W. H. MINER, INC.—*Richard H. Stinnett* named regional sales manager.

■

JOHN E. LEONARD, formerly with Pittsburgh Plate Glass Co., has opened an office in Neshanic, N. J., to act as sales agent and consultant in railroad supply industry.

■

BALDWIN-LIMA-HAMILTON CORP. — *Robert J. Buckley* appointed general manager of Standard Steel Division at Burnham, Pa., succeeding *John D. Tyson*, retired vice-president and general manager.

■

TIMKEN ROLLER BEARING CO.—Railway Division appointments: *P. C. Paterson*, assistant chief engineer; *H. M. Jones*, service manager (succeeding Mr. Paterson), and *T. C. Keller*, supervising engineer.

■

SKF INDUSTRIES, INC. — *Thomas W. Morrison* elected vice-president of engineering and research. Mr. Morrison previously assistant to the engineering and research vice-president.

■

AMERICAN BRAKE SHOE CO.—*Robert N. Post* and *B. E. Dunbar* appointed district sales managers, Railroad Products Division, with headquarters at Denver, Colo., and St. Louis, Mo., respectively.

■

UNITED STATES STEEL CORP.—*Don H. Steiner* appointed sales engineer for railroad and special products, eastern seaboard area.

■

GENERAL STEEL INDUSTRIES, INC.—Granite City, Ill., plant now a division of the parent company under the name *Commonwealth Division. Gordon L. McMillin*, president of Canadian Steel Foundries, Ltd., Montreal, general manager of new division.

■

DAYCO CORP.—*William F. Moore* named manager of railway sales, Rubber Products Division, with headquarters in Chicago.

■

UNITED SPECIALTIES, INC.—Following appointed manufacturers representatives to handle sales of Weldreel and Reel-King hose and cable reels: *H. P. Ackerman Assoc.*, Upper Darby, Pa., covering Eastern Pennsylvania, Maryland, Delaware and Southern New Jersey. *Albert Shannon*, 4138 Franklin Road, Pittsburgh, Pa., will cover Western Pennsylvania and northern tip of West Virginia.

■

FEDERAL - MOGUL - BOWER BEARINGS, INC.—AAR has approved roller-bearing assembly (RL&C, Sept. 1961, p 14) now designated as the "Red Cap" journal roller bearing for locomotives and cars.

■

OAKITE PRODUCTS, INC. — *Walter Boaeuf* appointed manager, Cleveland Division, succeeding *Fred H. Bruening*, retired.

■

GRIFFIN WHEEL CO.—Griffin, subsidiary of Amsted Industries Inc., plans to complete construction of a 105,000-sq ft steel wheel plant at Bessemer, Ala., in the summer of 1963. The facility, Griffin's seventh steel wheel plant in the United States and Canada, will have a capacity of 90,000 steel wheels annually.

Trade Publications

16. OIL HEATERS. Bulletin No. 4023-A describes Vapor Hi-R-Temp hot oil heaters. Includes specifications, schematic installation diagrams, and graphs for selection of proper heat transfer oils. Vapor Corp.

17. HOT BOX DETECTOR. Bulletin GEA 6950A describes electronic control system utilizing infrared sensitive scanners for trackside detection of overheated journal boxes on trains moving at up to 70 mph. General Electric Co.

18. BLIND BOLTS. Bulletin describes a new alloy steel blind bolt having a shear strength of 95,000 psi and designed to solve blind-side fastening problems in highly loaded structures. Huck Manufacturing Co.

19. HOSE LINE SELECTION. Bulletin No. 668 explains "How to Identify, Select and Install Hose Lines." Aeroquip Corp.

20. MATERIALS TESTING. Bulletin 180 outlines materials evaluation services available from MTL's network of 15 laboratories. Magnaflux Corp.

21. ADHESIVES. Catalog Z-SIDF-10S describes properties and typical uses of elastomeric adhesives, coatings, and sealers in transportation and other industries. Minnesota Mining & Manufacturing Co.

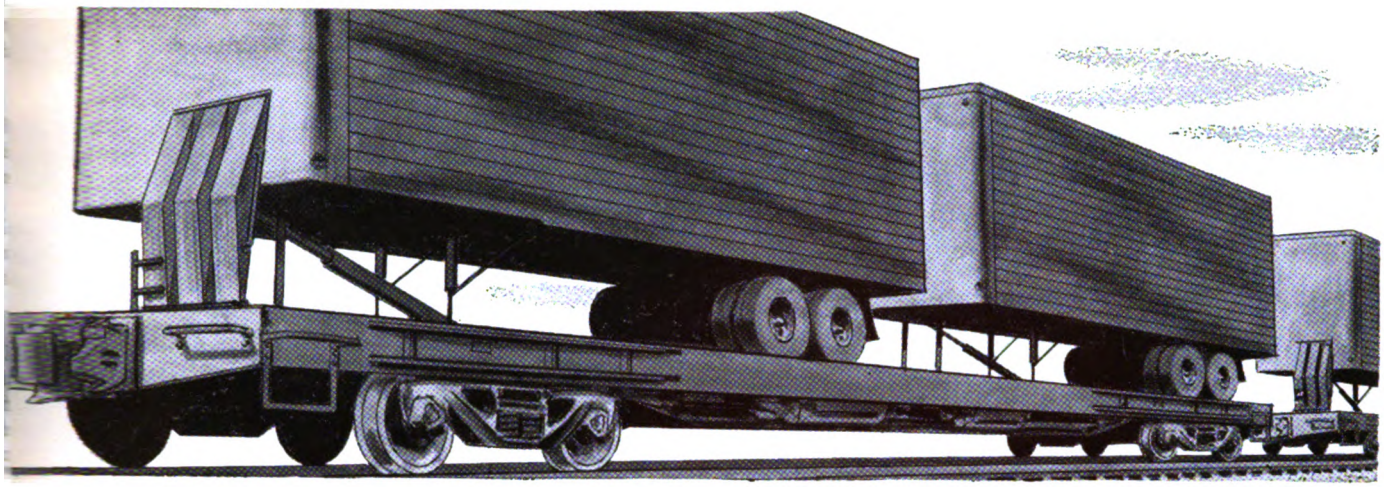
22. MAINTENANCE GREASE. Bulletin 69 describes how grease lubricates, why lubricating grease is better than an oil, questions to consider in selecting a maintenance grease. Properties of 35 Sun greases charted. Sun Oil Co.

23. EPOXIES. 2-page bulletin lists epoxy specifications for coatings, concrete and masonry surfacing compounds, and mortars for adhesive filling and caulking. Alden Corp.

24. STEAM BOILERS. Bulletin 586-B describes complete Vapor line of packaged watertube boilers. General specifications, dimensions, and rating charts of boilers from 18 to 150 bhp included. Vapor Corp.

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Today's long piggyback cars have special requirements when it comes to couplers and attachments. And Symington meets them with its Type F Interlocking Long Shank Coupler. Measuring 31 in. from horn to pivot pin hole, it is designed for extra-wide swing—13° each side of the centerline—and has brackets on the guard arm for angle cock attachments. Other fea-

- Longer service life, less maintenance because interlock design minimizes vertical motion and slack
- Interlock feature prevents slipover, keeps cars in alignment
- Safety shelf designed to support mating coupler in event of pullout

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May 1962

WHAT'S NEW — Send more information on products beginning on page 8:
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TRADE PUBLICATIONS — Send free literature listed on page 42:
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AAR Develops Journal Bearing

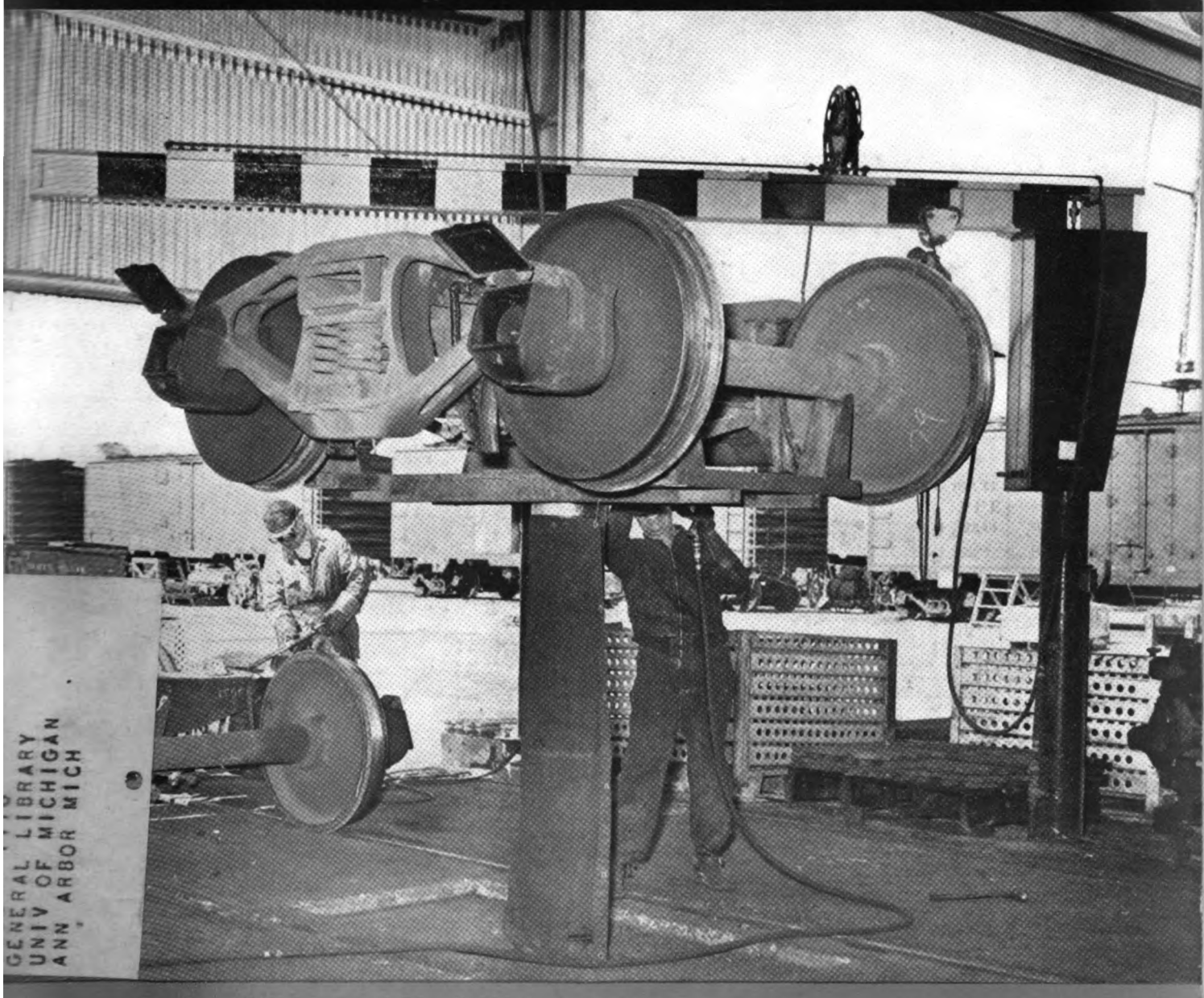
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What Can Diesel Lube Oil Tell?

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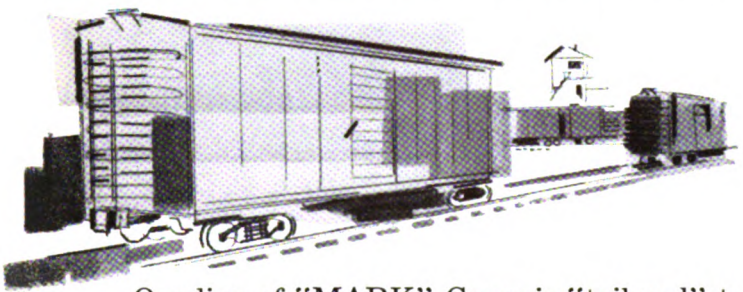
PFE Adopts 'Unit Exchange' for Car Trucks . . . page 34

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YOUR COSTLY DAMAGE CLAIMS!



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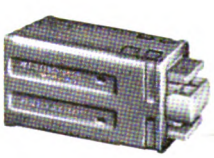
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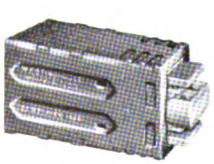
Westinghouse MARK 40

Friction gear for 24⅝-inch pockets; 3¼ inches travel. A.A.R. Certificate No. 35, under A.A.R. Specification M901-53.



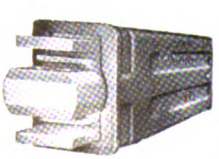
Westinghouse MARK 50

For 24⅝-inch pockets; 3¼ inches travel. Friction principle. A.A.R. Certificate No. 41, under A.A.R. Specification M901E-59.



Westinghouse MARK R500

A.A.R. Certificate No. 42; also met A.A.R. Specification M901E-59. Combination friction-rubber, for 24⅝-inch pockets; 3¼ inches travel.



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For 36-inch pockets. Extra high capacity friction gear. A.A.R. Certificate No. 37 under A.A.R. Specification M901C-56. Has 4¾ inches of travel.

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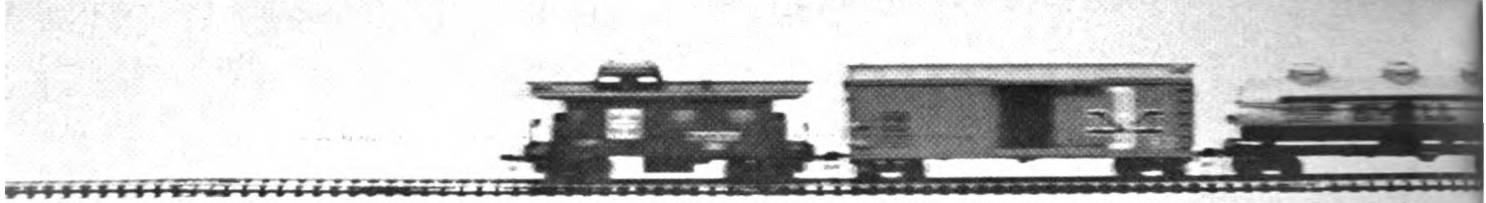
Designed for all-weather operation, the CP-991 operates on 115 volts, AC or DC. 230 volt universal AC-DC available. It is powered with a rugged, cool-running motor which packs a wealth of reserve power for this high-torque, high-speed application. No air compressor is needed!

For full information write to: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

CP-991-R-120, NEW Electric Impact Wrench for multi-deck auto carriers. Standard power: 115-volt, 60 cycle AC; or DC. Free speed: 120 rpm. 1" square drive. Standard equipment: 1 Special Adapter Socket, 10' of 3-wire cable with grounding plug.

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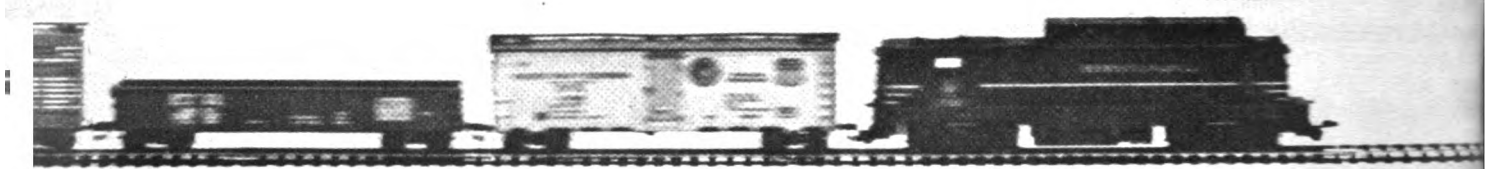
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MONTH AFTER MONTH AFTER MONTH AFTER MONTH...



YEAR AFTER YEAR AFTER YEAR AFTER YEAR...



IN SNOW AND RAIN, AND SLEET AND HAIL, AND DUST AND GRIT...



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WIKIT is economical to use because of its low initial cost, top performance record and easy, inexpensive renovation.

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REPORT FOR JUNE



W. T. Rice
ACL



O. H. Zimmerman
IC



C. D. Buford
AAR



W. M. Keller
AAR



J. W. Hawthorne
ACL



J. A. Welsch
IC



Fred Peronto
AAR



F. H. Stremmel
AAR

Mechanical Division Meets June 26-28

The 34th annual meeting of the AAR Mechanical Division, its first open convention since 1960, will be held June 26 to 28 at the Hotel Sherman, Chicago. Last year, as an economy measure, the division held a closed annual meeting attended by the Division's General Committee, technical committee chairmen, and a limited number of railroad representatives.

W. T. Rice, president, Atlantic Coast Line; C. D. Buford, vice president, Operations and Maintenance Department, AAR; O. H. Zimmerman, vice president - operations, Illinois Central, and W. M. Keller, vice president, AAR Research Department, will speak at this year's sessions.

Presentation of committee reports will be limited to a brief summary of each report's principal topics. J. W. Hawthorne, chairman of the Division and chief mechanical officer of the Atlantic Coast Line, has urged representatives of railroads, private car lines, builders and equipment manufacturers to review reports in advance and prepare questions and comments which they may wish to present during the discussion following each report. Other officers of the Division are: Vice-chairman J. A. Welsch, (general superintendent-motive power, IC);

(Continued on page 8)

TIME SAVING IDEAS FOR JUNE

AAR Research Develops Journal Bearing 27
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Why lading rides safer in cars equipped with

NATIONAL 3C* GLIDING SILL

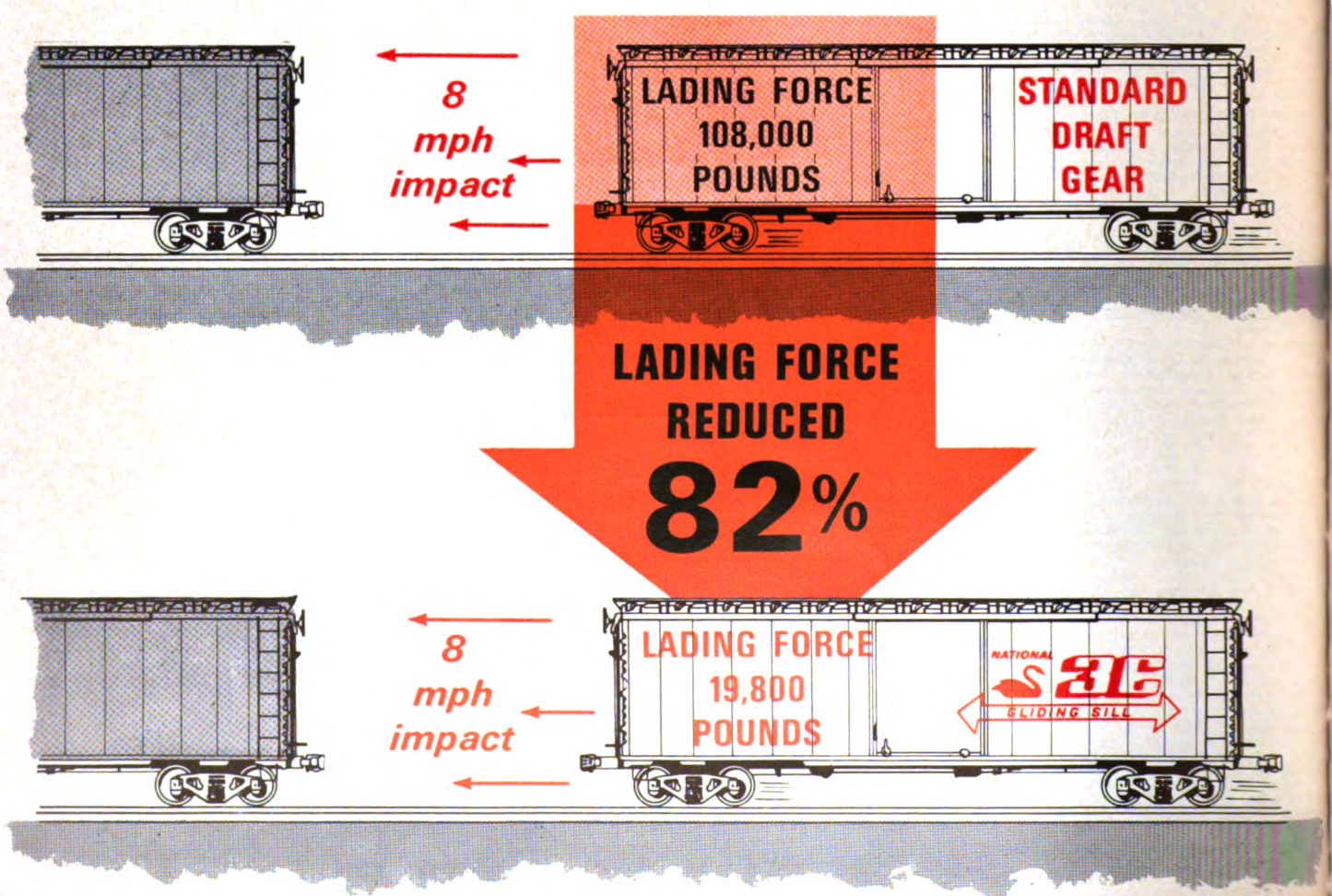
Sharp blows. Heavy blows. End-to-end blows that damage lading or car structures. They can now be s-m-o-o-t-h-e-d away . . . softly, gently — with the National 3C Gliding Sill.

As proven in tests and actual road service, the National 3C Gliding Sill provides optimum cushioning protection to lading, car structure, trucks and journals . . . minimizes the need for special loading equipment . . . is designed and constructed to fit existing or new cars having AAR standard center sills.

Because the 3C Sill's hydraulic unit responds *only* to dynamic forces, it operates *only* when shock protection is needed. Rubber draft gears, which operate in *buff* or *pull*, provide necessary protection for the sill during train operation.

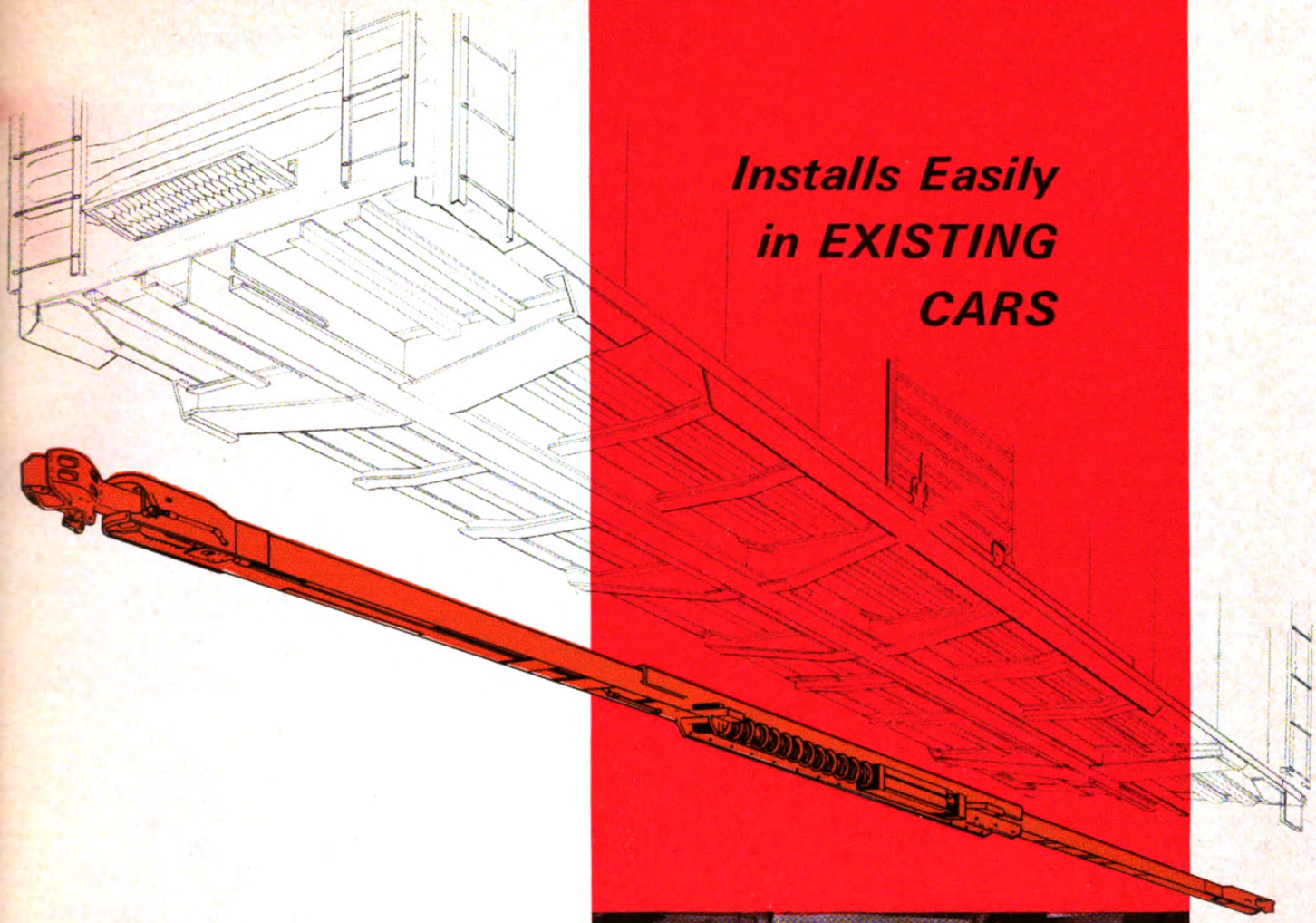
3C Gliding Sill equipped standard cars, 50 foot or less, will negotiate an AAR minimum radius curve (193 foot or 30°) and tangent with AAR *standard E60* couplers . . . will also negotiate the sharpest vertical curves in hump yards.

You'll soon be seeing the National 3C and Gliding Swan insignia on the country's finest Cushioned Cargo Cars. Your own cars, too — and they'll Cut Cargo Claims.

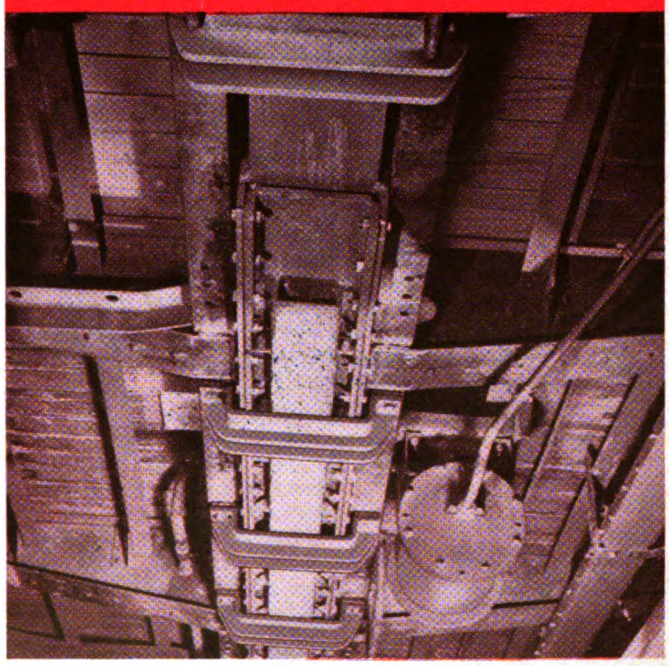


A-7125A

*Cushioned Cargo Car That Cuts Cargo Claims



Installs Easily in EXISTING CARS



Existing cars with standard AAR "Z" center sill construction can be modified easily, economically to provide the Gliding Ride with the National 3C. Package includes hydraulically cushioned sliding center sill with 24-inch travel in either direction. National 3C uses AAR standard couplers.

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(Continued from page 5)

Executive Vice-chairman, Fred Peronto; Secretary F. H. Stremmel.

At the opening session a Committee on Subjects will be appointed by Chairman Hawthorne to receive from members any special questions that are not included in committee reports. This committee will determine suitability of questions for discussion and report them to the convention at the appropriate time. Members are requested not to start discussions on special subjects that have not been referred to this committee.

Program

Tuesday, June 26, *10 a.m. to 5 p.m.*—Addresses by W. T. Rice, ACL president; C. D. Buford, AAR vice president, and Chairman J. W. Hawthorne (ACL); committee appointments; unfinished business; new business; report of General Committee; report on Mechanical Research (G. H. Newcomer, director AAR mechanical research); report of Nominating Committee (Chairman - W. L. Huebner, AT&SF). Discussion of committee reports on: Locomotive and Locomotive Fuels and Lubricants (Chairman - P. J. Finch, C&O); Wheels and Axles (Chairman - T. R. Fredriks (NYC); Specifications for Materials (Chairman - R. McBrian, D&RGW); Electrical Equipment - Rolling Stock (Chairman - J. W. Horine, PRR); Safety Appliances (Chairman - C. E. Pond, N&W).

Wednesday, June 27, *9:30 a.m. to 5:00 p.m.*—Address by O. H. Zimmerman, vice-president, IC. Discussion of committee reports on: Arbitration (Chairman - H. M. Wood, PRR); Prices for Labor and Materials (Chairman - L. H. Schierbecker, IC); Freight and Passenger Car Construction (Chairman - N. A. Passur, SP); Loading Rules (Chairman - N. A. Williams, UP); Brakes and Brake Equipment (Chairman - R. J. Dewsbury, C&O); Couplers and Draft Gears (Chairman - V. L. Green, CMSt-P&P).

Thursday, June 28, *9:30 a.m. until completion*—Address by W. M. Keller, vice president, AAR. Discussion of committee reports on: Tank Cars (Chairman - M. R. Buck, AT&SF); Journal Roller Bearings (Chairman - H. J. Stein, ACL); Lubrication of Cars and Locomotives (Chairman - M. A. Pinney, PRR). Election of members of General Committee; Report of Committee on Resolutions.

Transport Refrigeration To Be SAE Topic

Topics of railroad interest will be discussed at the 1962 National West Coast meeting of the Society of Automotive Engineers in Los Angeles on August 13, 14, and 15. Transportation refrigeration and diesel fuels are the subjects of two sessions which include railroad-oriented presentations.

On Monday, August 13 at 2 p.m., the session devoted to refrigeration will include Refrigeration in the Trucking Industry - S. M. Stubbs, Frozen Food Express; Controlled Temperature for Cargo Transportation - R. F. McKee, Pacific Fruit Express, and Mobile Refrigeration - R. E. Crowl and E. E. Melby, Thermo-King Corp.

Orders and Inquiries for New Equipment

Placed Since Closing of May Issue

Diesel-Electric Locomotive Orders

LOUISVILLE & NASHVILLE.—*EMD:* 29 GP-30's. Being acquired under EMD's locomotive-replacement program at a cost of $4,380,000, to replace 29 older diesel freight units.

MISSOURI PACIFIC.—*EMD:* 50 GP-18 units. Being acquired, with a trade-in of 75 1,500-hp FT's as part of road's locomotive replacement program (RL&C, Oct. 1961, p 8).

NEW YORK CENTRAL.—*EMD:* 10 2,250-hp units. *Alco:* 10 2,000-hp units.

UNION PACIFIC.—*EMD:* 75 2,250-hp units. *General Electric:* 12 2,500-hp units. Delivery of 87 units scheduled for second and third quarters this year.

Passenger-Car Orders

LONG ISLAND.—*Pullman-Standard:* 30 electric m-u commuter cars. Cars, on lease from Port of New York Authority, will be practically the same as those currently being delivered to the New York Central (RL&C, April 1962, p 17), 53 of which are being acquired at a cost of $8.2 million under New York State aid program.

PENNSYLVANIA.—*Budd:* 38 electric m-u commuter cars for use in city-sponsored, low-fare, frequent-service commuter operations. Cars, to be leased from Philadelphia Passenger Service Improvement Corp., are expected to be in service within 12 to 14 months. They will be financed by $5.4 million municipal bond issue.

READING.—*Budd:* 12 rail diesel cars, to be leased from Philadelphia Passenger Service Improvement Corp. which has received approval of a $3,000,000 federal loan from the Housing and Home Finance Agency for their purchase.

Freight-Car Orders

ATLANTIC COAST LINE.—*Pullman-Standard:* 300 50½-ft, 70-ton box cars, equipped with roller bearings, long-travel, sliding-sill cushioning devices, and damage free loaders. Cost, over $4,500,000. Delivery to begin in August.

CANADIAN PACIFIC.—*Dosco Trenton Works:* 300 insulated box cars specially designed for heater service. Cost, approx. $4,200,000.

CHESAPEAKE & OHIO.—*General American:* 25 Airslide covered hopper cars.

FRISCO.—*ACF:* 25 100-ton Center Flow covered hopper cars. For July delivery.

GREEN BAY & WESTERN.—*Pullman-Standard:* 20 DF equipped, 50-ft, 140,000-lb capacity PS-1 cars (for assignment to Ford Motor Co.); 5 DF equipped 40-ft, 100,000-lb capacity PS-1 cars (for assignment to Kelvinator). On lease agreement with Equitable Life Assurance Society. *United States Ry. Equipment Co.:* 42 box cars especially equipped for paper shipments. On lease.

KANSAS CITY SOUTHERN.—*Pullman-Standard:* 100 70-ton, 50½-ft PS-1 box cars with 9-ft doors; 50 70-ton, 50-ft 1-in. insulated box cars with plug doors and Hydroframe-60 cushion underframe; 100 90-ton PS-2, 4,000-cu-ft-capacity covered hoppers; 5 50½-ft DF box cars with 15-ft doors and nailable decks; 7 23,000-gal-capacity tank cars. *General American:* 10 70-ton Airslide 2,600-cu-ft capacity covered hoppers. *Thrall:* 100 60-ft, 100-ton flat cars with nailable steel deck. All cars in these orders to be equipped with roller bearings. Deliveries begun and to continue through August.

LOUISVILLE & NASHVILLE.—*Pullman-Standard:* 50 100-ton capacity box cars, to replace 50 70-ton box cars out of an original order of 450 70-ton cars (RL&C, March 1962, p 45). New cars are to be first of their type on any railroad, will be 60-ft long, with "Cushion-Cargo" underframes, 10-ft doors, and lading straps and anchors, for handling newsprint and similar cargoes requiring special protection.

MISSOURI PACIFIC.—*General American:* 300 70-ton insulated box cars. *Pacific Car & Fdry:* 100 70-ton mechanical refrigerator cars. *Greenville Steel Industries:* 100 60-ft flat cars.

PORT HURON & DETROIT.—*United States Rail Equip. Co.:* 400 42-ft, 50-ton, 7-ft-door box cars. Deliveries to be completed early in July.

SANTA FE.—*ACF:* 200 2,900-cu ft capacity Center-Flow covered hopper cars for use in potash service.

SAVANNAH & ATLANTA.—*ACF:* 100 50-ton, 7-ft wide-door box cars. For October delivery.

SOO LINE.—*Pacific Car & Fdry:* 14 50-ft, 70-ton insulated box cars, with roller bearings and 20-in. travel cushion underframes, 10-ft plug doors, and special load-securing devices. For transporting foodstuffs. *Ortner:* 10 52½-ft covered gondola cars equipped with movable bulkheads, removable roofs, and roller bearings. For transportation of finished steel products.

Notes and Inquiries

Burlington carbuilding expenditures, which are expected to total $7,200,000 this year (RL&C Jan., p 7; March, p 45), will include 100 freight cars that will be built and insulated with polyurethane foam at the road's Havelock, Neb., shops. This, reportedly, is the first time a railroad has undertaken such work in its own shops.

Louisville & Nashville will install tri-level auto racks on 25 TTX flat cars at a cost of $164,250.

New York City Transit Authority may place orders this year for an additional 1,024 subway cars—724 to be acquired under a bond issue authorized by legislation signed by Governor Rockefeller, and 300 for which Mayor Wagner plans to ask capital funds.

Rock Island will purchase 25 dry-flow type, 70-ton covered hopper cars at a cost of approximately $325,000.

Soo Line freight-car-acquisition and heavy-repair program, costing $880,000, includes acquisition of cars listed above and the rebuilding, in company shops, of 111 40-ft box cars, 115 50-ft box cars, and 26 hopper and gondola cars. All cars will be in service by August 31.

Wabash will rebuild 300 gondola cars at its Decatur, Ill., shops. Earlier (Feb. RL&C, p 81), road had announced plans for rebuilding 350 box cars. Total cost of program estimated at $2,400,000. An additional $249,000 will be spent to install special devices on existing cars.

The Wednesday morning session will include a paper on Diesel-Hydraulic locomotives - P. V. Garin, Southern Pacific, and another on Monorail Systems - A. Anderson, Alweg Monorail. During the Fuels session Wednesday afternoon, two authors from the Southwest Research Institute—J. M. Clark and H. M. Bunch—will describe Dual Fuel Combustion of Propane in Railroad Diesels, and G. E. Irish, J. L. Keller, W. L. Kent, and R. W. Mattson of Union Oil Co. will discuss Cleaner Injectors and Less Smoke with Hydrogen-Treated Diesel Fuel.

UP Orders 87 Locomotives

One of the biggest locomotive orders in recent years was announced last month by the Union Pacific. UP will acquire 75 2,250-hp units from EMD and 12 2,500-hp units from General Electric at a total cost of "more than $20 million." Delivery is scheduled for the second and third quarters of this year.

In addition, four 2,000-hp passenger locomotives, originally built in the mid-1940's, will be upgraded by the manufacturer, with horsepower increased to 2,400 hp. With other planned modifications, says UP, the converted units will be comparable to new 2,400-hp locomotives.

In announcing the new locomotive order, UP President A. E. Stoddard commented "Substantial expenditures for new equipment and facilities are necessary if we are to maintain our physical plant at peak efficiency. We have confidence in the future of the railroad industry and plan to have the tools on hand to do the job."

The backlog of locomotive orders has increased considerably in recent months. EMD has recently indicated that it has orders for over 600 2,250-hp GP-30's from 17 railroads.

Class I railroads, in 1961, installed 250 new locomotive units—218 diesel-electric.

(Continued on page 58)



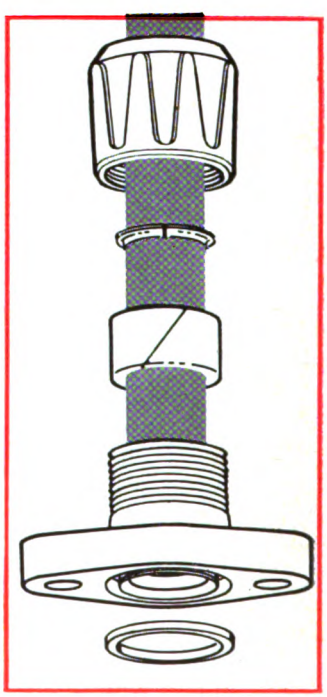
Upgrade Cars which have Old Type Threaded Fittings

gripseal CONVERSION KITS

Improved performance and important economies highlight advantages you get when you use GRIPSEAL CONVERSION KITS in complying with new Interchange Rule 61 (a-1-a). The GRIPSEAL kits include the same compression nuts, anti-extrusion rings, and Teflon coated compression rings used in complete GRIPSEAL fittings, and are available for ⅜", ½", ¾", 1", and 1¼" pipe. Their use insures obtaining a permanent, positive seal with plain, threaded, or even existing broken piping. Since the kits may be used with existing threaded type flange bodies that are suitable for re-use, savings as much as $8.00 per car are possible.

GRIPSEAL assemblies provide both ample latitude for variations in pipe length and the necessary flexibility to tolerate pipe misalignment... yet plenty of support so that no pipe clamp is needed. If compression rings become charred when thawing lading, a new split compression ring is easily installed without dismantling piping.

Take advantage of the opportunity to save dollars in making the conversion required by Interchange Rule 61 (a-1-a)...write for full information today.

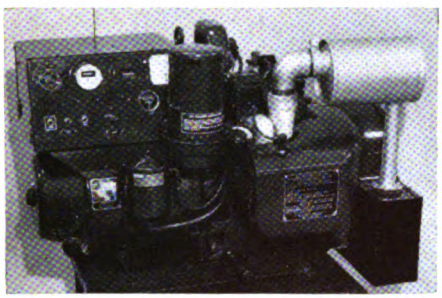


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THE NEW YORK AIR BRAKE COMPANY

230 PARK AVENUE • NEW YORK 17, N. Y.



Engine-Generator

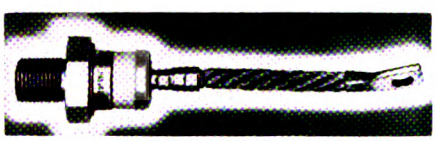
The Kohler 6.5 kw generator set designed for mechanical refrigerator cars and trucks can be operated either on gasoline or propane. The model K662, 4-cycle, 2-cylinder opposed gasoline engine develops 15 hp at 1,800 rpm. Standard equipment includes heavy-duty air cleaner, Air-Vac cooling, mechanical fuel pump, automatic choke and lubricating oil filter. The exciter cranked generator has a rotating armature with built-in 12-volt exciter cranking winding, self-adjusting brushes and is self-ventilated with drip-proof construction. Voltage regulation is within plus or minus 3%, and frequency regulation within three cycles. Generator models available are 230-volt and 115/230 volt remote start. Kohler Co.

For more information, circle 6-1 on coupon on page 65.

Spray Booth Liner

A fire resistant plastic type coated sheeting, Resista-Cote, is cemented to spray booth walls to form a tough, permanent lining that resists adherence of paints, adhesives, or common spray coatings. Over-spray can be blotted off with paper while still wet, or peeled off when dry thickness indicates removal is necessary. The material can also be used for making of reusable stencils for lettering and identification. It is available on a square-foot basis in rolls of sheets 36 in. wide. Demp-Nock Co.

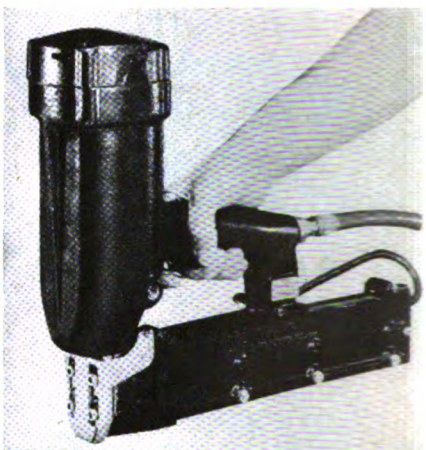
For more information, circle 6-2 on coupon on page 65.



Silicon Rectifiers

The high-power silicon rectifier line (JEDEC registration 1N317A to 1N3174A) has maximum peak reverse voltage ratings to 1,000 volts at 240 amp. It features an alloyed junction, ceramic insulation to provide greater creepage distances between anode and cathode, metal-to-ceramic seal with welded metal joints for lifetime hermetic seal, and hard solder construction which eliminates thermal fatigue problems Westinghouse Electric Corp.

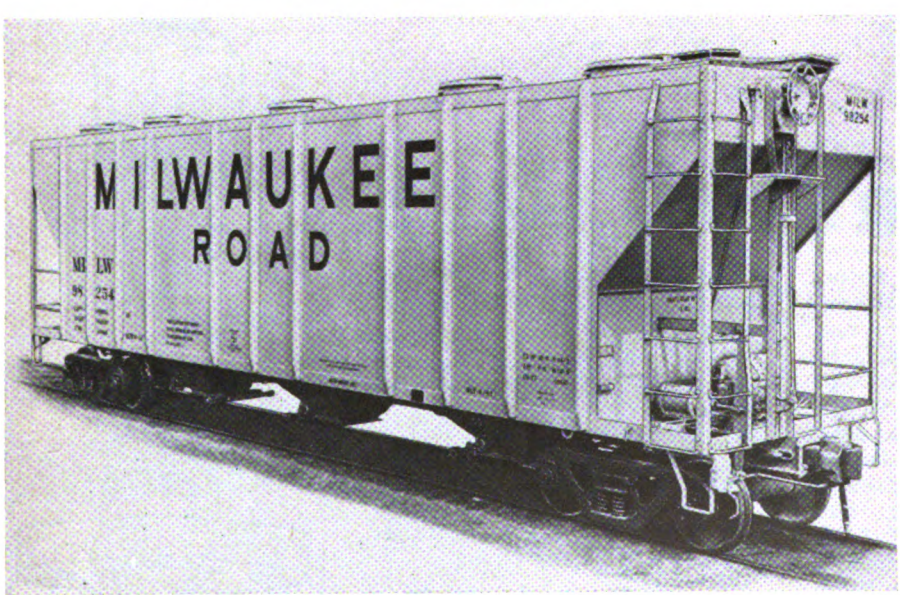
For more information, circle 6-4 on coupon on page 65.



Nailer

The Model S lightweight magnesium Spotnailer is said to be the first portable gun powerful enough to drive an 8-penny, 2½-in. nail. The gun features top loading, extra length magazine and automatic trip-fire. According to the manufacturer, the tool is well balanced, easy to handle and reduces net nailing costs as much as 50%. Spotnails.

For more information, circle 6-5 on coupon on page 65.



Covered Hopper

Field tests of PS-2 covered hopper car for handling barley and malt are said to have proved "highly successful," with an average of 137,000 lb of malt being pneumatically unloaded in approximately 90 min. The car meets specifications recently established by the Barley & Malt Institute and the U.S. Brewers Association. It has a capacity of 4,000 cu ft and can be unloaded from either side pneumatically, or by gravity through its three center outlet gates. The car has 45-deg slope sheets and is plastic lined to prevent lading contamination. P-S has delivered, or has orders for, a total of 330 of the cars. The Milwaukee, Wabash, Great Northern, Nickel Plate, and Kansas City Southern are among the ordering roads. Pullman-Standard.

For more information, circle 6-3 on coupon on page 65.



Gas Cutting Nozzle

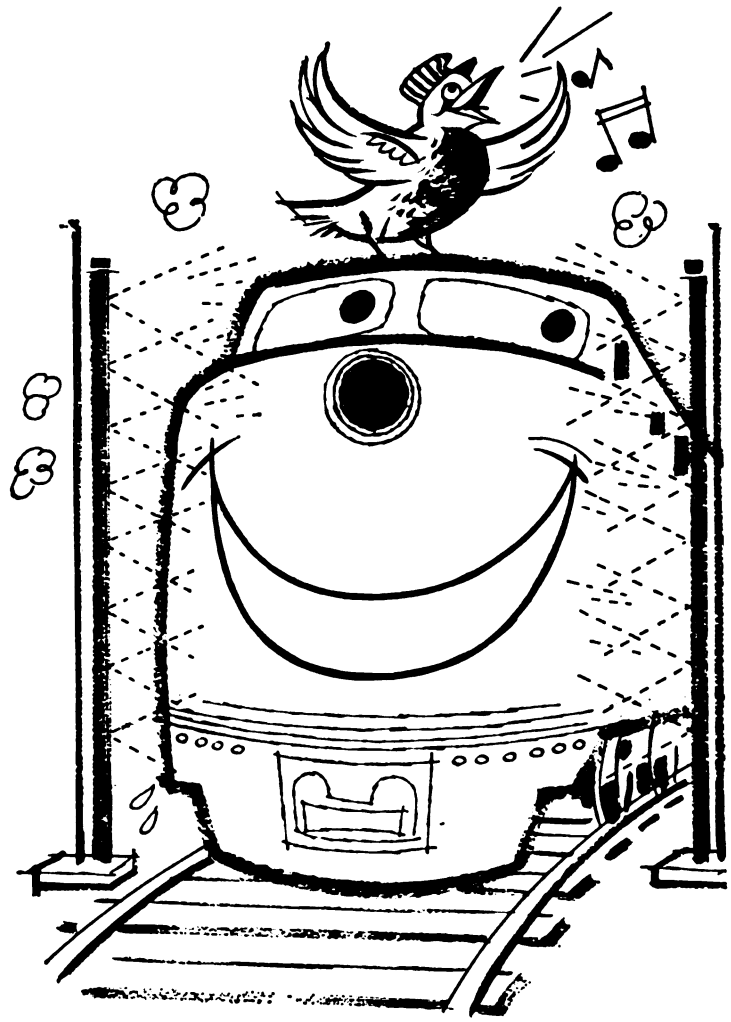
The short-length Oxweld No. 1541 Series nozzles are said to be ideal for cutting inside pipes, boiler tubes, and other cramped areas, using natural gas, propane, or butane. The torch head and nozzle are 2⅜ in. long, compared with 4⅛ in. for combined length of torch head and standard nozzles. With a 90-deg angle head cutting torch, the 1541

(Continued on page 15)

CREATIVE RESEARCH • QUALITY PRODUCTS • PROFESSIONAL SERVICE

IT'S WORTH CHIRPING ABOUT...

Wyandotte products clean locomotives better at lower cost



When you can get cleaner locomotives and cut costs at the same time, that's something to chirp about! And that's exactly what you get with the cleaners developed by Wyandotte especially for this use.

And Wyandotte—the largest company in the railroad-cleaning field—can give you a wealth of know-how when it comes to using these products. Wyandotte blueprints, for example, have helped many railroads install time-saving, money-saving, locomotive-cleaning processes. They're available to you, too.

Call your Wyandotte railroad-cleaning specialist. Get the benefits of Wyandotte's long experience.

These are some of the Wyandotte locomotive cleaners designed to cut costs:

WYANDOTTE 85—the mild acid cleaner which gets road films.

Used together with:

WYANDOTTE 939—the newest locomotive cleaner on the market. It has a unique solvent and detergent action which digs out the worst grimes.

or:

WYANDOTTE 548—the utility, mild alkaline cleaner for average soil conditions.

Wyandotte Chemicals

J. B. FORD DIVISION

WYANDOTTE, MICHIGAN • LOS NIETOS, CALIFORNIA • ATLANTA, GEORGIA



On the Rio Grande...
the Revolutionary GP-30



On the Denver & Rio Grande Western, thirteen General Motors GP-30 Diesel locomotives speed freight westward from Denver and Pueblo to Salt Lake City and Ogden. The most significant development since Diesel replaced steam, the GP-30 combines high speed/heavy drag capability . . . offers measurable economies in operation and maintenance . . . the advantages of increased efficiency and earning power through planned locomotive replacement.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS · LA GRANGE, ILLINOIS

HOME OF THE DIESEL LOCOMOTIVE • In Canada: General Motors Diesel Limited, London, Ontario

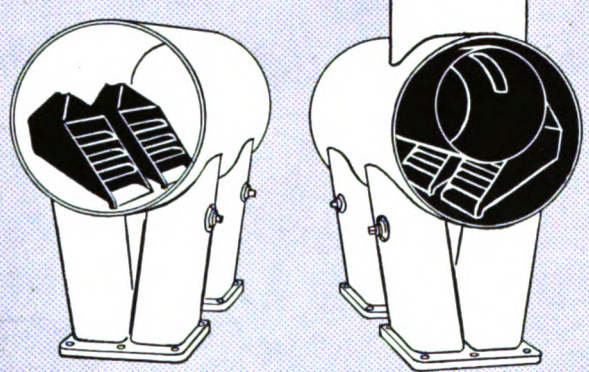
GENERAL MOTORS LOCOMOTIVES

EASIER INSTALLATION... LESS DOWNTIME!

AIR-MAZE spark arrester conversion kits!

FOR DIESEL LOCOMOTIVES

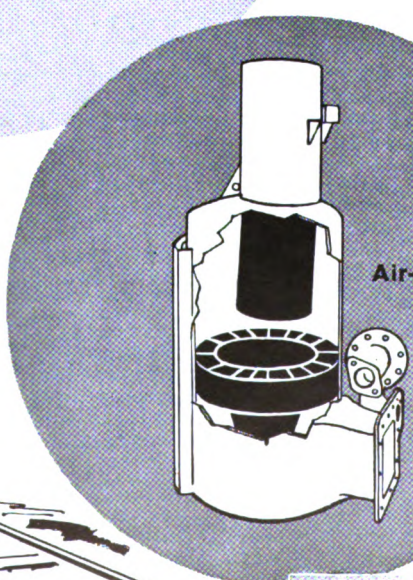
Air-Maze Kit for EMD manifold

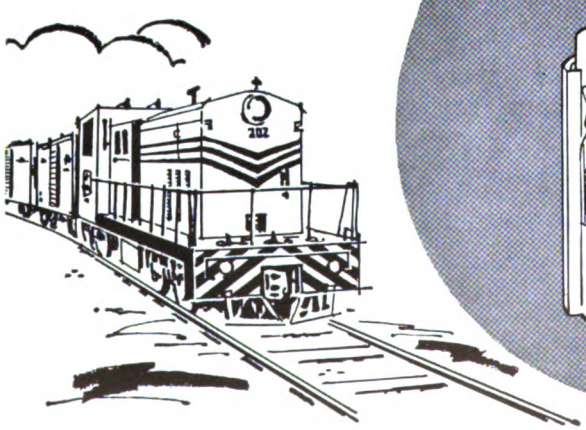


Air-Maze Spark Arrester Kits eliminate the need for obtaining a new manifold to get effective spark control. Deflecting vanes can be simply installed in original manifold during routine engine shopping. Simplified design minimizes number of man hours required for conversion . . . alignment problems sometimes encountered with fitting and welding are minimized.

The Air-Maze Spark Arrester is designed for use with the exhaust manifolds of both EMD and FM switcher and road units. It operates on the principle of centrifuging incandescent particles to reduce their size and temperature before they are exhausted. The addition of the Air-Maze Spark Arrester Kit does not affect engine performance.

Air-Maze Kit for FM manifold





GEARED TO PROGRESS

P R I MEMBER

AIR-MAZE DIVISION
CLEVELAND 28, OHIO

ROCKWELL R STANDARD

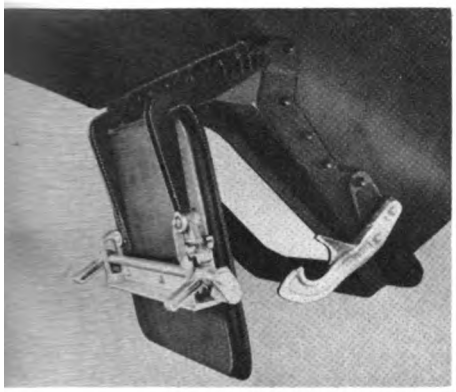
ROCKWELL-STANDARD CORPORATION

Engine Air Filters • Car Body Filters
Lube Oil Filters • Passenger Car Filters

(Continued from page 10)

ıozzles slice through steel in areas with only ½ in. clearance. Two nozzle sizes are vailable for cutting thicknesses from 1/16 o 1½ in. Linde Co.

For more information, circle 6-6 on coupon on page 65.



Hopper Door Lock

The cam action principle of this full-width single-hopper door lock makes operation easy and provides reserve power for pulling doors up tight or quickly opening stuck or "frozen" doors. Only nine rivets are required on the initial installation which consists of three parts—inside and outside hooks and door member assembly. When first opened, the door drops only part way, permitting discharge of fine materials, or limiting the opening if a conveyor system is inadequate for full discharge. The lock is fully visible and operative from the side of car. After door has been brought to its final locked position, a locking pawl keeps door locked. The entire assembly is above the lower edge of the door, out of the maximum corrosion zone. Wine Railway Appliance Co.

For more information, circle 6-7 on coupon on page 65.

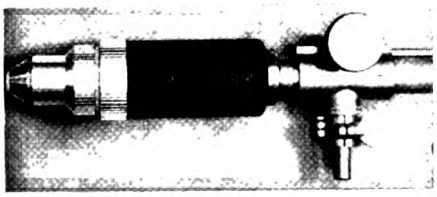
Fuel Dispersant

Paradyne 6, an ashless fuel-oil dispersant, combines dispersancy, stability, and haze and emulsion protection in a single compound. For diesel or residual fuels, it is said to improve performance and reduce equipment maintenance because of increased filterability, reduced injector-sticking, reduced exhaust smoking. Effective concentrations of the dispersant, which contains a polymer as its active ingredient, range to 100 lb per 1,000 barrels, with a normal dosage of 10 to 30 lb per 1,000 barrels. The liquid has a viscosity of 225 SSU at 100 deg F; 75 SSU at 210 deg F, and a specific gravity of 0.89. Enjay Chemical Co.

For more information, circle 6-8 on coupon on page 65.

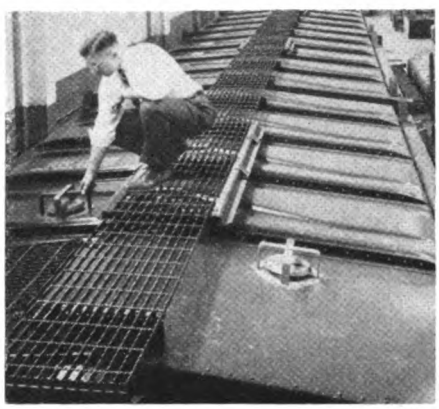
Plasma Torches

Compressed air is used as a gas to operate the H-30 hand-held and the M-30 machine-held cutting torches. Both models have interchangeable electrode and cutting tips and will operate from the same plasma system:



control console, compressed air or gas supply, d-c power supply. Compared to oxyacetylene cutting of ½-in. plate, this Thermal-Air cutting is said to offer cost and time savings. Good-quality cuts can be made in ½-in. steel at 75 in. per min, and high-quality cuts at slightly slower speeds. The hand-held torch has a 30-in. handle, with trigger remote switch for start-stop; operates up to 50 kw, and will cut all metals up to 1½ in. thick. The machine model operates up to 150 kw and can cut 3-in. material. The torches are internally cooled by a high velocity flow of water. Thermal Dynamics Corp.

For more information, circle 6-9 on coupon on page 65.



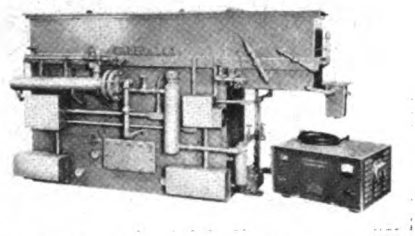
Vented Gondola Cover

The interiors of three covered gondolas on the Western Pacific are being kept relatively free of moisture through the use of vented covers developed by Bliss & Laughlin in cooperation with the WP. The vents, it is said, have eliminated the condensation and tendency for rust to mar the finish on the cold finished steel bars which the cars handle to major steel service centers throughout the west. Bliss & Laughlin.

For more information, circle 6-10 on coupon on page 65.

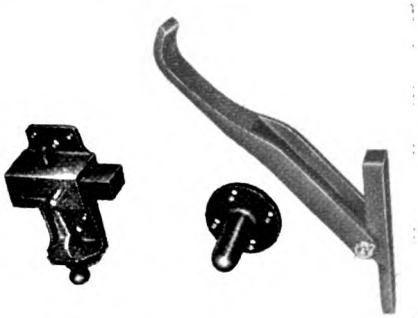
Ultrasonic Degreaser

Freon, methylene chloride, chlorethylene, trichlorethylene, or perchlorethylene can be used interchangeably in the Model US-4SP ultrasonic degreaser, without operating adjustments. The unit distills and reclaims solvent automatically. Because less solvent is used, a warm liquid-vapor cycle may be used instead of a liquid-liquid-vapor cycle. Solvent may be distilled into an outside container during clean-up or reclamation. The unit has three separate chambers—a boiling liquid chamber, an ultrasonic chamber, and a vapor chamber—with a vapor area over its entirety. Most of the foreign matter is removed in the boiling



liquid. The parts are transferred automatically to the ultrasonic chamber where cleaning is completed. In the vapor chamber parts are completely dried. Branson Equipment Co.

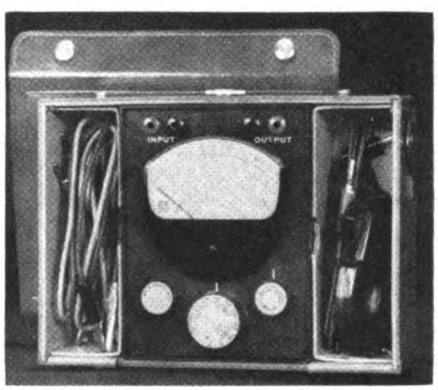
For more information, circle 6-11 on coupon on page 65.



Car Door Hardware

Cast-steel outside locking and starting fixtures for set-in doors on baggage, express, storage, mail and special cars can be installed with ordinary shop tools and are said to be trouble-free in operation. They are interchangeable for either right- or left-side door openings. Midland Railroad Equipment.

For more information, circle 6-12 on coupon on page 65.



Air-Conditioning Tester

Circuits and temperatures of heating and air-conditioning systems, it is said, can be checked quickly with the Systems Tester. The meter can measure alternating current values to 75 amp at 300 volts; direct current to 1,500 millivolts; resistances to 3,000 ohm, and temperatures from 70 to 1,500 deg F. A self-contained adjustable power source supplies up to 300 milliamperes d-c for continuity checks on unpowered circuits. The d-c value is read on the meter. A clamp-on transformer for measuring alternating

(Continued on page 55)

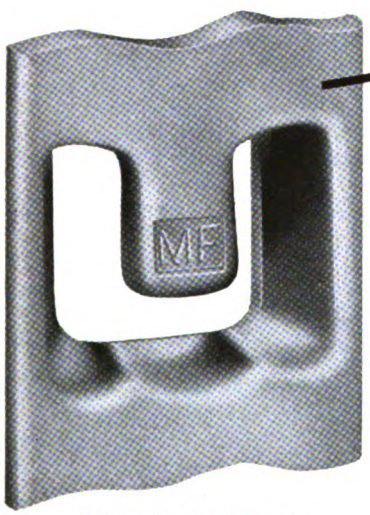
WRAP it in STEEL,

STRAP it with STEEL...

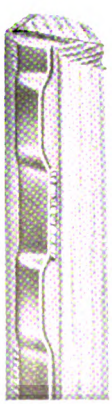


Independent survey reveals wood lining maintenance averages $80 per car per year!

and ANCHOR it with M·F



Tongue design eliminates threading, gives constant tension, instant release. Note self-cleaning feature.



at right: M·F Door Post Anchor

CARRIERS: Smooth, batterproof steel is a *permanent,* NO maintenance lining.

M·F anchors in *any* style — continuous bar or individual; open-tongue, or closed; for steel, wood or plywood; for *any type of car;* in *as many* locations as desired — *always protect the lading and the lining!*

SHIPPERS: Smooth, splinter-free steel protects the *lading.*

M·F anchors, flush with the lining, offer NO projections to rip bags or damage cartons, crates and cans.

an M·F car is a Maintenance-Free car

MACLEAN-FOGG LOCK NUT COMPANY

5535 N. Wolcott Ave. Chicago 40, Ill. EDgewater 4-8420 / *IN CANADA: THE HOLDEN CO., LTD., MONTREAL*

GEARED TO PROGRESS RPI MEMBER

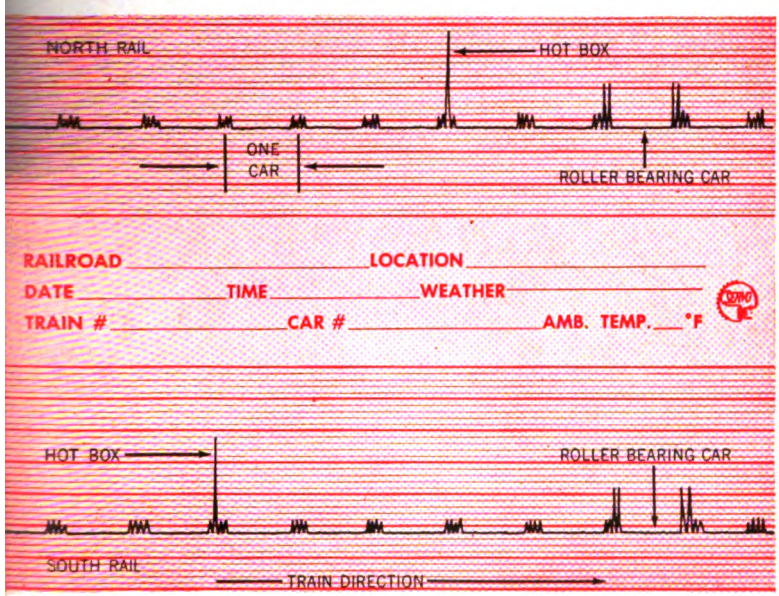
ARE YOU CAUGHT
N A 'BARN DOOR' MAINTENANCE PATTERN?

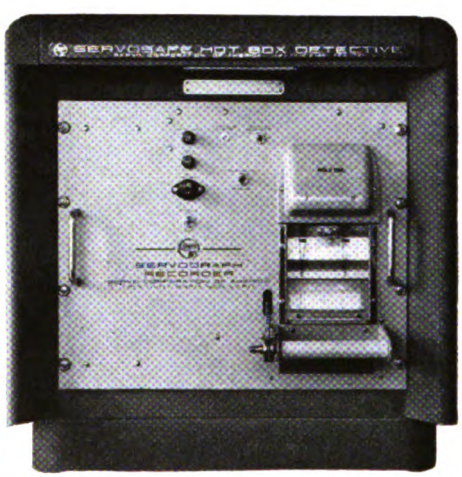
aintaining heat-damaged journals is like closing the barn door after the runaway. Once repaired, wheel assemblies an roll again—but only at increased cost and lost time for added maintenance.

y contrast, consider the railroad with an approach-to-yard SERVOSAFE® Hot Box Detective* ystem, keyed to a program of selective maintenance. Minutes before the train enters the yard, ıspectors and their crews have a "log" of every journal on it. This tape, beamed from ıfrared scanning units a few miles away, indicates and gives the exact location of any verheated journal assemblies. Maintainers go directly to these locations... concentrate their ime on *servicing* hot boxes, not *looking* for them.

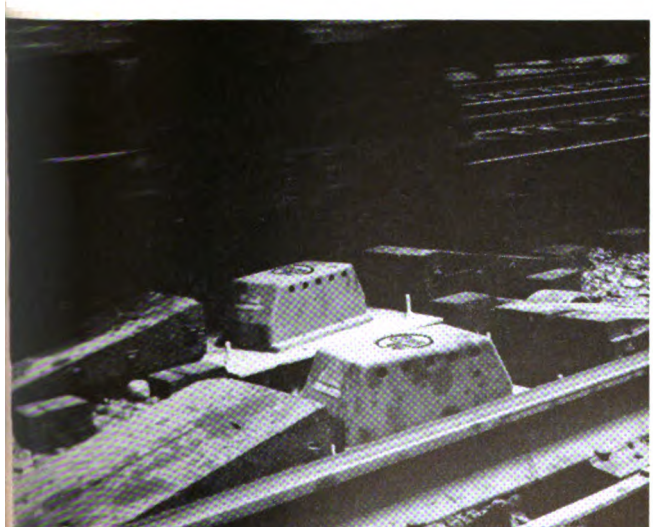
ERVOSAFE® Hot Box Detective Systems save time and money on the main line, too. heir 100% inspection, and the concentrated yard maintenance based on its results, greatly educe the chance of faulty bearings on outgoing trains... nip incipient hot boxes ı the bud to prevent costly bearing damage, burnoffs, and derailments.

ERVOSAFE® Hot Box specialists have more than eight years' experience in the early detection f hot boxes. Get with them soon and blueprint your own program for increased yard fficiency based on selective maintenance and SERVOSAFE® Hot Box Detective Systems.





In the yard, a SERVOGRAPH® Recorder tapes the relative heat of each journal on approaching trains. Normally high-temperature roller bearings are readily distinguishable as groups of four high pips. Suspected hot boxes show well above the normal mean.



Outside the yard, 100% incoming inspection... automatically proportioned to train speed... is provided by the SERVOSAFE® Hot Box Detective System. Trackside scanners like these sense infrared heat radiation from each passing journal.

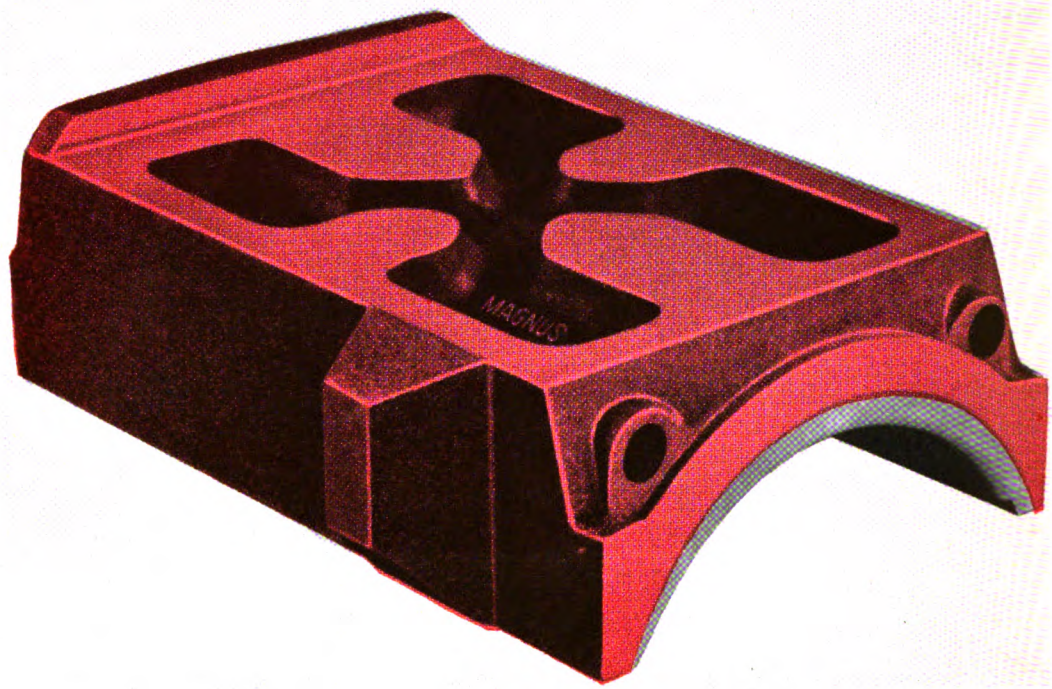
Railroad Products Division

SERVO CORPORATION OF AMERICA

111 New South Road • Hicksville, L. I., N.Y. • WEIls 8-9700

**Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.*

MAGNUS FLAT-BACK BEARINGS...



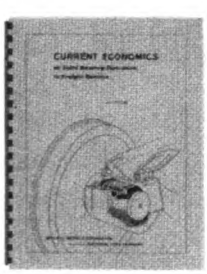
the LOW-COST way to stabilize journals and get still better freight car performance

Today, freight cars with lubricators average better than four times the performance with waste packing in 1954—and cost per car per year for journal bearing operation and maintenance has been cut more than half. Better still, total costs for *solid* bearings today are less than the fixed charges on the extra investment in roller-type bearings.

The next big step toward improved performance is the *flat-back bearing*—available from Magnus to AAR specification and design, in nominal and step-sizes. It effectively restricts fore-and-aft movement of the journal under all normal operating conditions—makes it possible for the bearing to remain seated on the journal and to provide uninterrupted lubrication.

Several leading railroads are applying flat-back bearings to all new standard interchange freight cars. One railroad is converting existing equipment to flat-backs at repack periods.

Flat-backs prevent excessive journal displacement—increase the efficiency and service life of present-day rear seals. They require no additional labor to install and, through improved performance, can quickly pay for the slight extra cost.



CURRENT ECONOMICS OF SOLID BEARING OPERATION

New economic study updates AAR Report 20,000 insofar as it covered solid bearing costs in 1954—shows how lubricators have cut these more than half despite increases in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, N. Y. or to 80 East Jackson Boulevard, Chicago 4, Ill.

MAGNUS
METAL CORPORATION
Subsidiary of
NATIONAL LEAD COMPANY



Scores of Standard Wheel Truing Machines in railroads and industry keep freight rolling dependably. *For complete information, contact Standard Railway Equipment, Hammond, Ind.*

Specialist R. J. Deceuster ...keeps Standard Wheel Truing Machines in trim with periodic checks

From Canada to South America, Standard experts like Joe Deceuster with 18 years in the railroad industry take a personal responsibility for a Standard Wheel Truing Machine—responsibility that lasts from manufacture through installation and the life of the equipment.

"Joe" knows each individual machine as if it were his own child. He keeps a record of its individualities and a history of its performance, and he often recommends preventive maintenance measures to keep this machine in operation.

Truly, there can't be anything square about a wheel. And the Standard Railway Equipment Wheel Truing Machine keeps wheels round and on rails most economically—and dependably.

STANDARD RAILWAY EQUIPMENT
division of STANRAY CORPORATION
HAMMOND, INDIANA • CHICAGO • NEW YORK • SAN FRANCISCO

RSI MEMBER

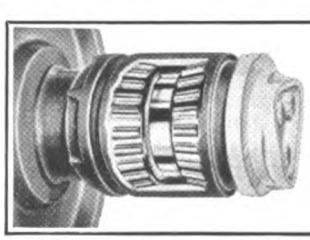


WE USE MORE NICKEL THAN THE U.S. MINT

In fiscal 1960 the U.S. Mint used 696,000 lbs. of nickel to make 252,518,941 nickels. In calendar year 1960 we used several times more nickel than the U. S. Mint to make Timken® bearings better.

It's the high nickel content in fine bearing steel that gives it the best response to heat treating—provides more uniform high quality in every bearing. So we take the trouble to make our own bearing steel and make sure it's nickel rich. No other American bearing manufacturer does. It makes Timken bearings hard on the outside to resist wear, tough on the inside to resist shock.

And the heat treatment for every single Timken bearing you buy or use is case carburization providing a hard, wear-resistant surface and a tough, high shock capacity core. The fact that they're precision made from the finest nickel-rich bearing steel is one of the reasons Timken bearings are solving the hot box problem. The Timken Roller Bearing Company, Canton 6, Ohio. Makers of tapered roller bearings, fine alloy steel and removable rock bits.



QUALITY TURNS ON
HEAVY DUTY
TIMKEN®
TAPERED ROLLER BEARINGS

EDITORIALS

The Shortest Leg

Everyone has probably at some time been seated at a table that rocks. Nothing can be as frustrating as deciding what should be done. Is one of the legs shorter than the others? Is there more than one short leg? Is the floor level? Would it be best to solve the problem with a saw . . . or shims?

It certainly is important to define this problem before attempting to solve it. An attempt at solution which is not methodical can leave you with an unstable footstool in place of the unstable table you started with. Correction of deficiencies in even the most complicated mechanical devices is not much different. And correction of the most serious shortcoming in any system can only mean that the next-most-serious deficiency then moves into first place.

Over the past decade the standard freight-car truck has received much attention from the manufacturers of its components, from individual railroads, and from the AAR research organization. With the disappearance of the steam locomotive, the freight-car truck has undoubtedly become the primary reason for train-servicing delays and probably the major consumer of mechanical department man-hours in yards and running repair facilities. The truck would seem to be in undisputed first place as the cause of road delays and equipment failures.

At an AAR research seminar last year, Dr. O. M. Solandt, Canadian National vice president—research, commented: "If the railway future lies in long-haul freight business, the most fundamental need is for a low-cost, thoroughly reliable freight-car truck requiring a minimum of maintenance and very infrequent inspection. This will require radical changes in the basic design of the truck, brakes, and wheels. The solution to the bearing problem lies in good engineering and an integrated truck design . . . Improved reliability is essential to safe and reliable automatic train operation."

Such a truck would call for a look at the overall design. Over the past decade much effort has been expended on the most troublesome components—on the obvious "short legs." The "shortest" of these—the waste-packed, solid-bearing journal-box assembly—has received the greatest attention. Everyone must concede that there are today available a series of ways to render this into a relatively trouble-free assembly, requiring less inspection and servicing. But even when most efforts were being devoted to this, it was realized that there were other truck components which warranted improvement—other "short legs." The wheel and axle assembly is one of these. The requirements for larger wheels on heavier cars, the scheduled ban on cast-iron wheels, and the present investigation of the fatigue strength of high-capacity axles indicates that this "leg" is getting deserved attention. Brakes and brake rigging have also been the subjects of investigations and developments. At the moment, the principal emphasis in a new field seems to be on the center plate. This important bearing has recently been receiving a great deal of attention (RL&C, April 1962, p 35, and this issue, p 27).

All this leaves the structural components, bolster and side frames, and the springing system as portions which have received relatively little attention in the past few years. These had been brought to a fairly high state of development previously. However, as train speeds increase and various types of shock-absorbing mechanisms are incorporated in car underframes, the springing may easily become the "shortest leg" of the future.

This was indicated by the comment of P. V. Garin, manager of mechanical engineering and research, Southern Pacific, at the AAR seminar. "While progress has been made in cushioning longitudinal shocks," Mr. Garin said, "more attention must be given to vertical cushioning. This would indicate a need for a more stable truck without so much lost motion and so many loose parts. The spring system is vitally involved. Studies of non-linear spring systems have been made, but more must be done."

Short of an AAR-sponsored study of the complete freight-car truck in the light of future requirements, it would seem that it may soon be time to do something about suspensions. In the years ahead, shippers are not going to accept excuses about the shortcomings of equipment supplied to them, and railroads must have freight equipment which will consistently operate at higher train speeds. Springing may well become a key factor in both cases.

Needed—A Sherlock

A short time ago we heard a top mechanical officer say that his railroad had discontinued laboratory analyses of diesel lubricating oil samples. This action was taken because of lack of confidence in the oil control program.

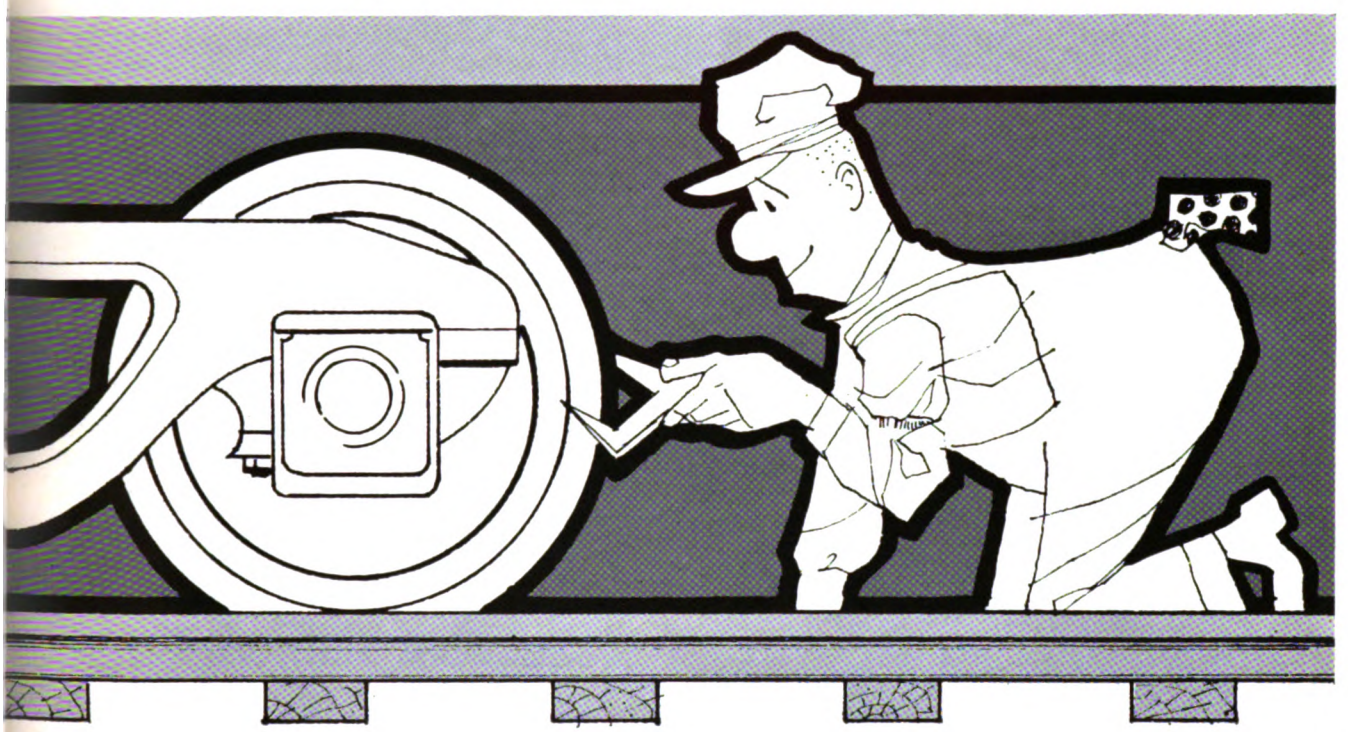
We do not know exactly what caused the loss of faith in this instance, but possibly this railroad did not have a top-quality sleuth interpreting the test results. Tracking down the culprits causing diesel engine defects requires first-class detective work. This was brought out during the recent meeting of the National Railroad Lubrication Council, reported on page 43 of this issue. In his paper, Max Herzog, engineer of tests, Frisco, said "The man in charge of the oil control program must have a first-class memory, a passion for detail, keen powers of observation, initiative, and a complete set of records for each engine." The description fits that of the ace detective made famous by A. Conan Doyle.

This appraisal reminds us of a conversation with a veteran general foreman whom we asked about the major difference between diesel and steam locomotive maintenance. He said, "With steam we took five minutes to find the trouble, a week to fix it; with a diesel it takes a week to find it and five minutes to fix it."

With diesels, perhaps we should make sure that we have qualified detectives.

LOOK UNDER YOUR CARS

New steels are born at Armco



Yes, look under your cars. Gaging will quickly show plenty of service metal left on Armco One-Wear Wheels with 15, or even as many as 20 years on the rails. Such service is not the exception. It's the rule — and for good reason.

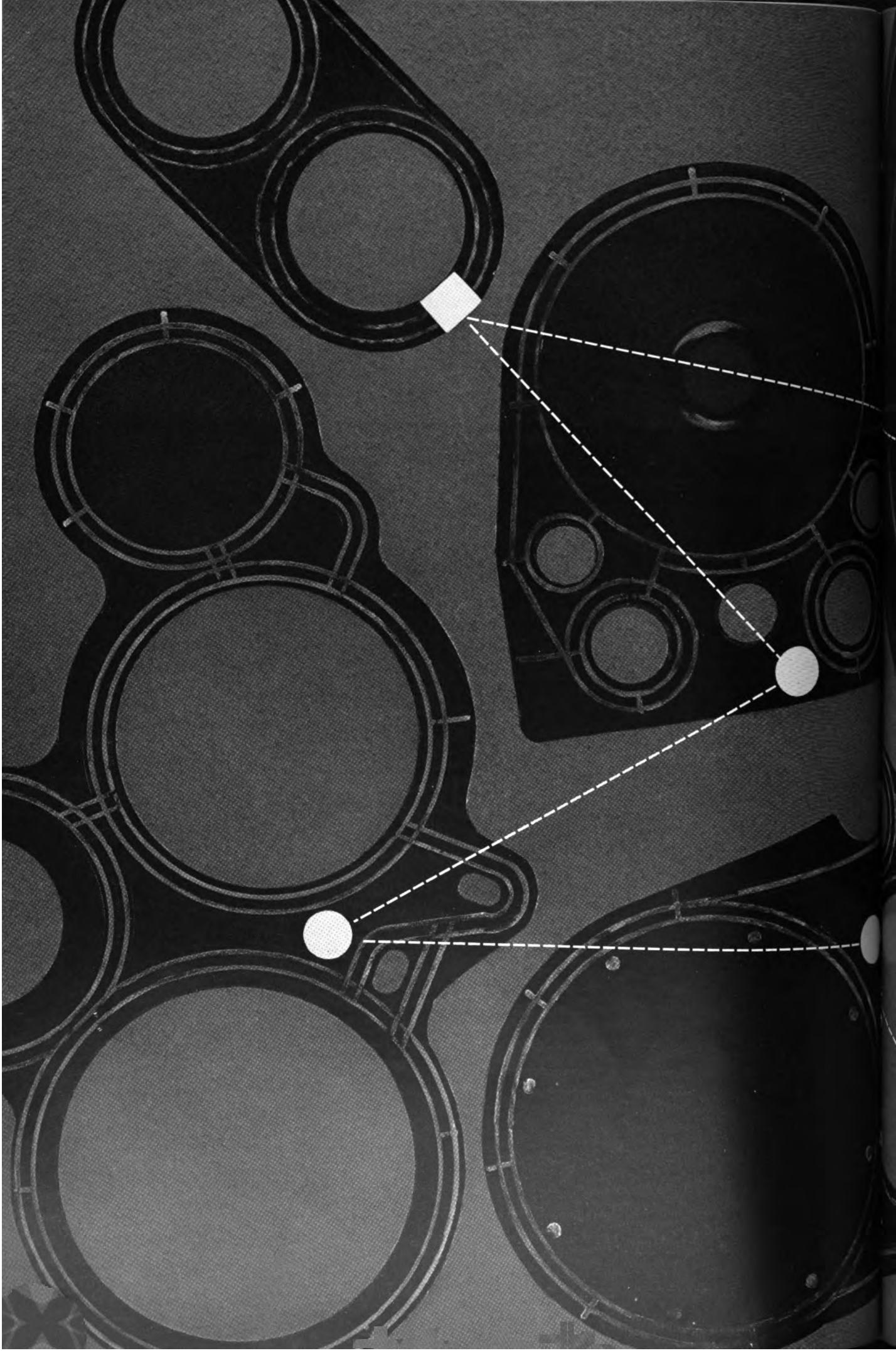
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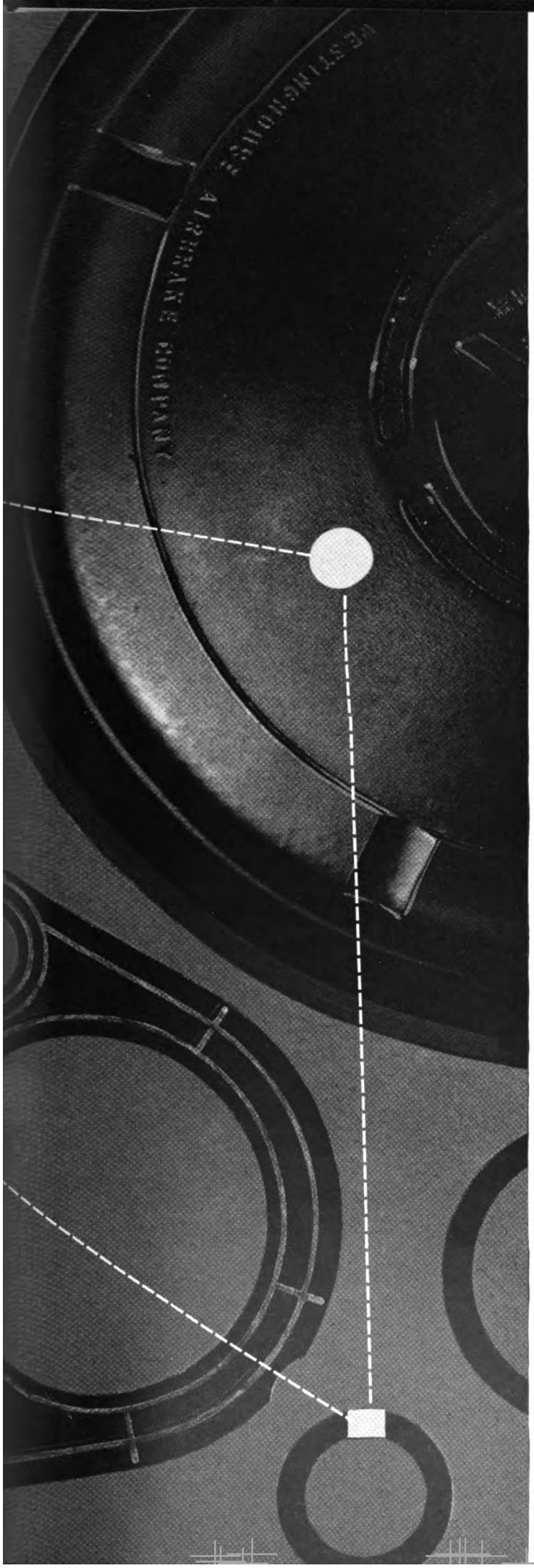
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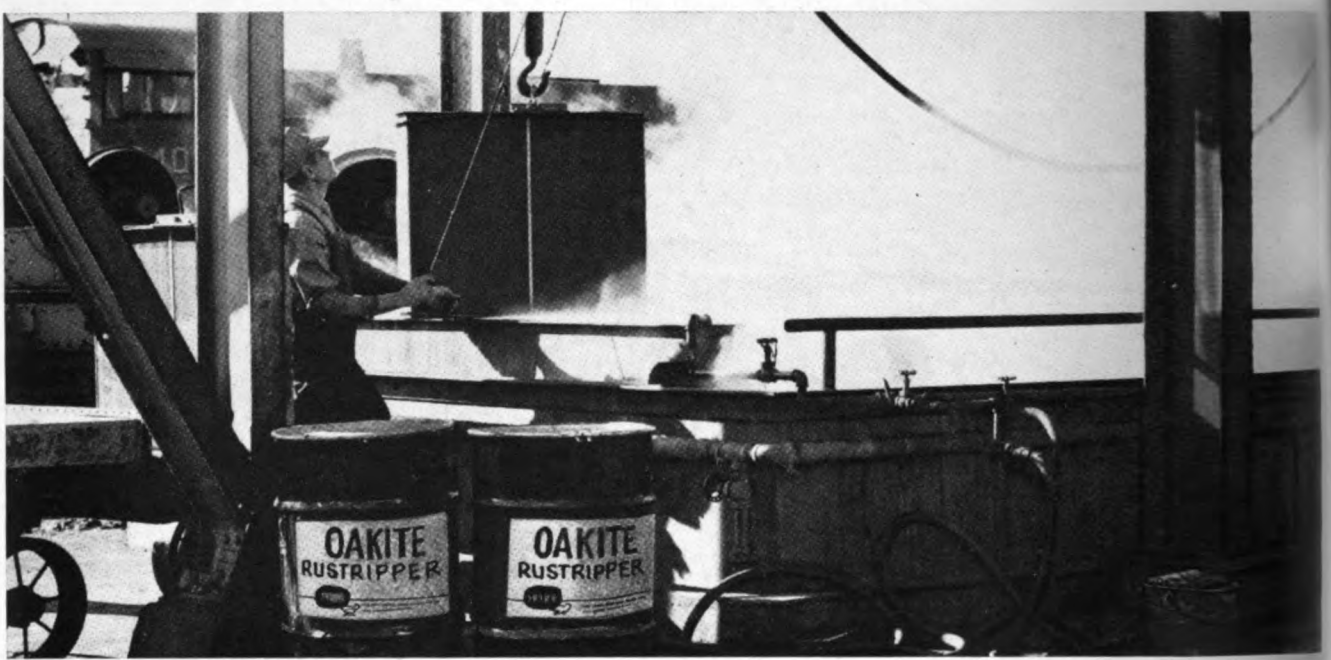
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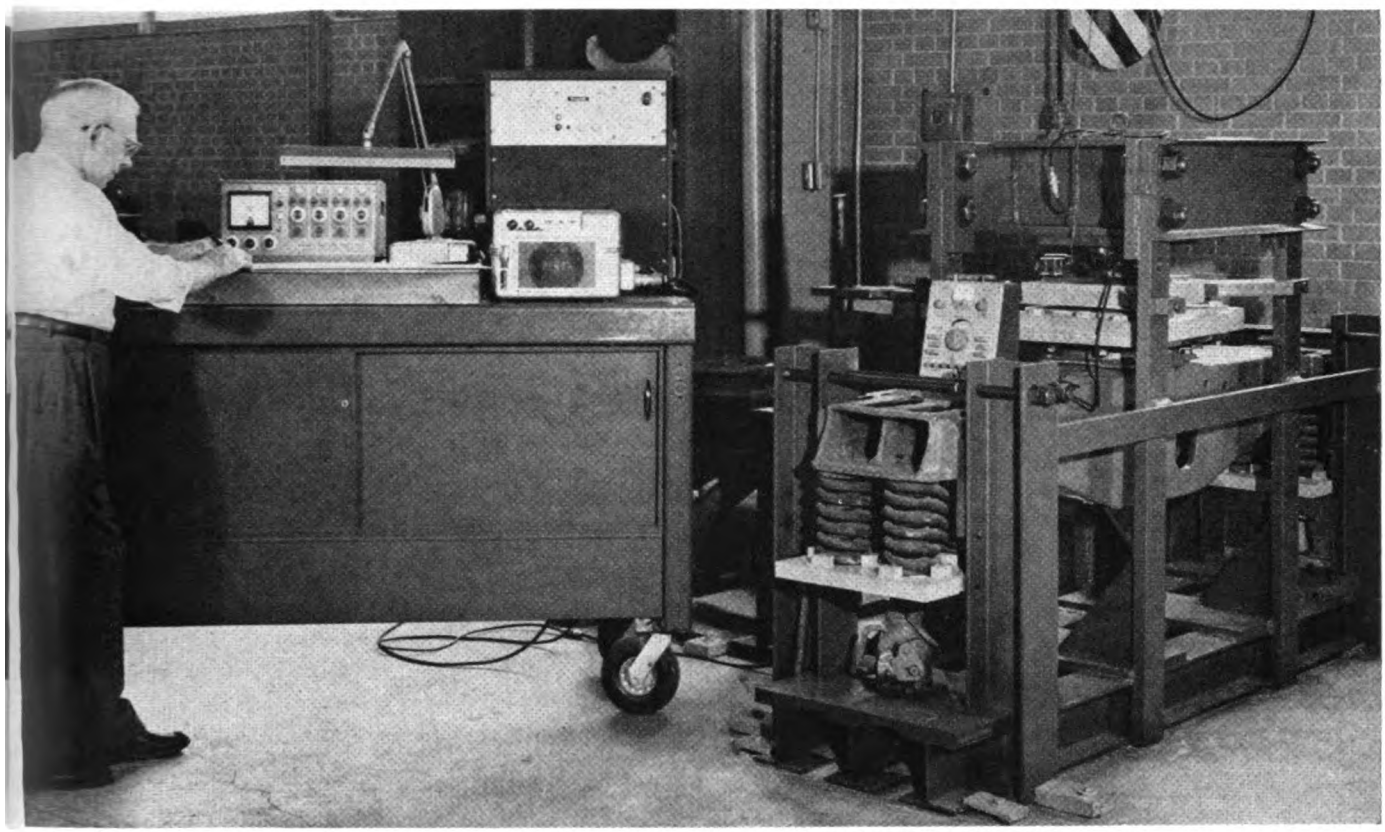
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Center plate studies are being made with new test device which can rotate mated plates under variety of loading conditions.

AAR Develops Journal Bearing

Research Center emphasizes car truck refinements; other car and locomotive components investigated

Development of a new plain bearing and wedge, design of a new truck with 38-in. wheels for 100-ton cars, and tests of truck center-plate friction are among important research projects under way at the AAR Research Center in Chicago. While car-truck improvements have received much attention, many other car and locomotive devices have also been under investigation at the Center, G. H. Newcomer, director of mechanical research, told Railway Locomotives and Cars recently.

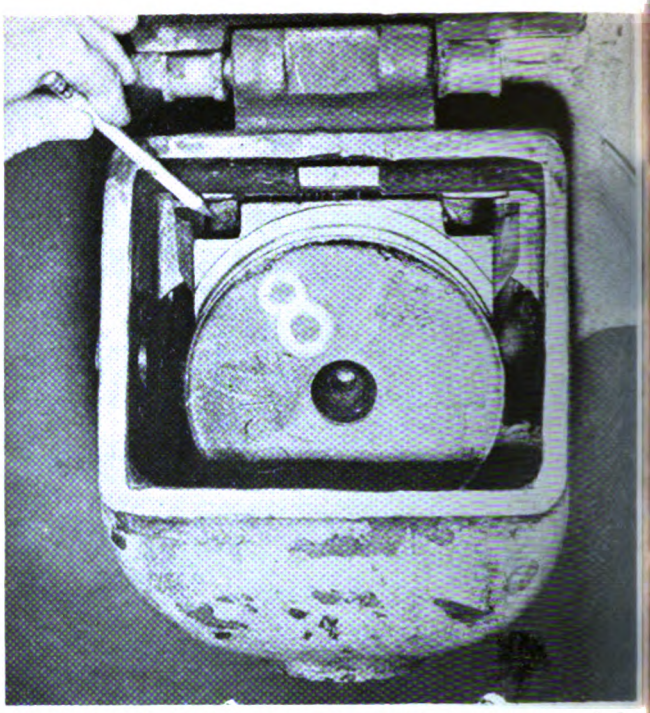
Improved solid-bearing performance, including changes in the journal-box assembly, has been actively pushed during the past year. Involved have been such components as journal stops, rear seals, and hardened journal-bearing wedges. Laboratory equipment for accelerated aging of complete journal lubricators and their components has been developed. Aging standards are to be a part of the AAR specification for lubricators. On May 1, 13 lubricators had conditional approval and four were approved for test application. In the Interchange Rules issued Jan. 1, 1962, a total of 30 devices were listed in these two classifications.

High-speed motion-picture studies made during 1961 to show the stability of solid-bearing journal assemblies indicated that additional changes might be feasible in the drive to improve performance. Journal stops or flat-back bearings gave the journal assemblies the greatest stability. Some improvement in stability was produced by increasing the angle of contact of the sides of the standard steepleback bearing and its wedge to 60 deg from the standard 45 deg. As a result of this investigation, a new design of plain bearing and wedge, the "Hi-hat," was developed. In this the side contact surfaces between bearing and wedge are vertical. Two car sets are now undergoing field-service tests. The top of the 6- x 11-in. bearing is flat and measures 4½ in. x 7⅞ in. This back has the same length as the standard bearing, but is 1 in. wider. The new bearing weighs less than the flat-back type.

The Hi-hat has the advantage of



Hi-hat journal bearing and wedge incorporate features which are intended to give positive locking between these two important parts.



Greater stability of Hi-hat bearing assembly is expected to further improve hot-box set-off figures which have been setting new records.

absorbing impacts on the wedge and eliminates the possibility of pinching the bearing which can occur when there is no locking between the bearing and wedge. With stabilized journal assemblies (stops or flat-back bearings), the AAR expects the average for all railroads to be over 1,000,000 miles per hot box setout. The Hi-hat bearing is expected to improve this figure.

Studies are continuing on the use of friction-reducing and corrosion-inhibiting additives in journal-box oils. Tests have also been started to determine the effect of journal surface finish on the coefficient of friction of a babbitt-steel system. These are intended to show the importance of turning a journal to a smooth finish and of burnishing the surface. Volatile corrosion inhibitors are being evaluated to estimate their effectiveness in reducing corrosion on stored journals. Use of radioactive phosphorous 32 to determine wicking and feed characteristics of lubricators has been discontinued temporarily because of more pressing projects. The quantity of moisture which can be removed by AAR-specified renovation of lubricators after immersion in water is also being investigated.

A new center-plate friction machine has been put in service. It is being used to test lubricants which might function for longer periods than the materials now used on these bearing surfaces. New male and female center castings are used for each test. Dry center plates loaded to 40,000 lb required a friction force of 12,000 to 15,000 ft lb for rotation of 10 deg in each direction. With collodial-graphite oil, this was reduced to 2,000 ft lb. Eleven lubricants and twelve liners of varying thickness and different materials are scheduled for study. Some liners are perforated and some are coated with Teflon and different grades of graphite in plastic binders.

The AAR laboratory program to give complete tests, including the eight weeks' simulated service, to all roller-bearing greases to meet Specification M-917-60 was due for completion about June 1. Revised Specification M-917-60 includes a new procedure for determining the rust-preventive properties. The complete tests under M-917-60 were undertaken when failures and distress in roller bearings showed some evidence of being caused by improper greases and ineffective seals. The Mechanical Division reported that the latest designs of roller bearings have been involved. Only greases approved under M-917-56 have been authorized for use recently (RL&C, Jan. 1962, p 5).

The Center has recently evaluated a report prepared by the Office of Research and Experiment of the French National Railways covering a study of five types of lithium base and four types of lithium-calcium base greases. These greases contain 77½ to 92% petroleum base material. Conclusions of the French study were:

- Grease will lubricate satisfactorily if it is not lost from the box due to excessive softening, or if it does not "channel" because of hardening;
- None of eleven test machines supplies all the data necessary to evaluate grease performance;
- Bench or laboratory tests must be supplemented with service tests;
- Further studies of sodium-base and lime-base greases are necessary.

Truck Designs

An aluminum freight-car truck of completely new design is being studied in cooperation with an aluminum manufacturer. A new type of air spring and rubber-laminated center-plate liner are under study for this truck. Laboratory tests will be made to establish the feasibility of this rubber-sandwich liner. The liner is keyed to the bottom and top center plates, eliminating metal-to-metal contact between them. The keys hold the rubber sandwich rigidly in place on each plate, with truck swiveling causing the rubber to be placed in shear. From 10 to 15 deg of swiveling in each direction is considered adequate for maximum track curvature and can be achieved in the laminated rubber design.

A cooperative program involving the Research Center and the Truck



Squeeze test was made on 4,000 cu ft covered hopper built by Ortner Freight Car Co. Said to be first car of conventional shape without center sill, its draft and buffing loads are transmitted through 18-in., 42.7 lb per ft channels which form the side and end sills.

Manufacturers Engineering Committee has produced a new conventional truck design with 38-in. wheels for 100-ton cars. This is to be the subject of letter ballot action for inclusion in the AAR Manual. The design will permit use of 38-in. wheels with a standard 27-in. center-plate height. Use of 40- and 42-in. wheels in such a truck was also studied. Offset of the couplers below the center sill and clearance problems which would be involved with these larger size wheels led to the conclusions that such an arrangement would not be practical.

Axle research continued on the fatigue testing machines. Studies remaining in this program include:

- Effect of stress relief grooves between the wheel seat and gear fit;
- Capacity ratings for diesel locomotive axles of standardized designs;
- Effect of increase in the diameter of the center of the axle body, dimension K, in the 6 x 11 size;
- Comparison of axles having only normalized heat treatment with those having a K dimension exceeding 6½ in. which now must receive a double-heat treatment.

A number of axles are in service on cars in continuous operation carrying loads above stencilled limits to develop information on possible reduction in fatigue life.

In another axle investigation, wheel hub pressures have been found to produce high stresses in axles during mounting. The effects of the resulting residual stresses in wheel seats are being investigated on all axles being prepared for the fatigue testing machines. Measurements to date indicate that present wheel-seat diameters do not provide proper allowance for press fitting of the wheel. This study may develop data that will result in recommendations to increase the diameters of wheel seats on axles to improve axle life.

Brake Investigations

Modification of the AB valve emergency portion, replacing ring pistons with rubber diaphragms, has been completed and laboratory tested. Service tests are currently being made. The modified emergency portion can pass both the AB-rack test and single-car test. Changes in the end cover and ball check are required, although modification of the portion requires no machining of the body casting. Air brake manufacturers now have a similar conversion kit for modification of the AB service portion (RL&C, March 1962, p 32), and 7500 interchange installations have been authorized.

Tests of two pilot models of a modified AB valve which includes the retainer valve show promise. If successful, this design could replace the retainer located on the end of each car and would eliminate the piping involved. Further modification will be studied and road tests will be made to tell if the final design of this retainer could give acceptable control of long trains on grades.

Brake-beam vibration studies may be the basis for altering the test procedures of the present specification with the object of eliminating brake beams not performing satisfactorily and shortening the time required for official approval. Evaluation of composition brake shoes involving stopping, break-away, icing, and similar problems is under way. Economic studies will be made later on shoe life and tread wear. A special letter ballot will cover certification tests to be required on all brake-cylinder release valves to meet new specifications. The release valve must be designed to function properly on any manufacturer's bracket.

Locomotive Fuels

Five test diesel fuels were sent to a member road laboratory where micrographs were made. Pictures of these fuels were made as received, after aging, and after treatment with two types of dispersive additives. The additives tended to reduce the fuel particle size, which is expected to yield better combustion. Supplementing these studies, laboratory tests have been made with the Center's single-cylinder diesel test engine to determine if the expected improvement in burning qualities of the

fuel resulted from use of the additives. The D&RGW is installing an EMD 567-D engine on a car for full-scale evaluation of fuel oil (RL&C, Feb. 1962, p 38). Results with the laboratory test engine will be compared with these full-scale tests. A specification now in effect covers disposable fuel-oil filter elements used on the discharge side of the fuel transfer pump on diesels. A study of the type which produced that specification is now being started on lubricating-oil filters. It will include consideration of the relationship between the nature of the oil and its filtration.

The Research Center has a device for making squeeze tests of freight and passenger cars. Typical of the recent work done with this equipment was the test of a covered hopper car built for the Soo Line by the Ortner Freight Car Co. Because this car has no conventional center sill, carrying buff and draft loads through heavy side sills, its reaction under high end forces was observed at the laboratory. This is one of the steps involved in having new types of rolling stock approved for interchange.

Tests of stronger car ends have been made at the Research Center because of shipper's reluctance to accept cars with bowed ends caused by lading forces developed during impacts. Trials have been made of sections fabricated at the Center using laminated edge-grain hardwood reinforced with aluminum extrusions attached with epoxy cement. The new end shows greater load resistance and can deflect without permanent set.

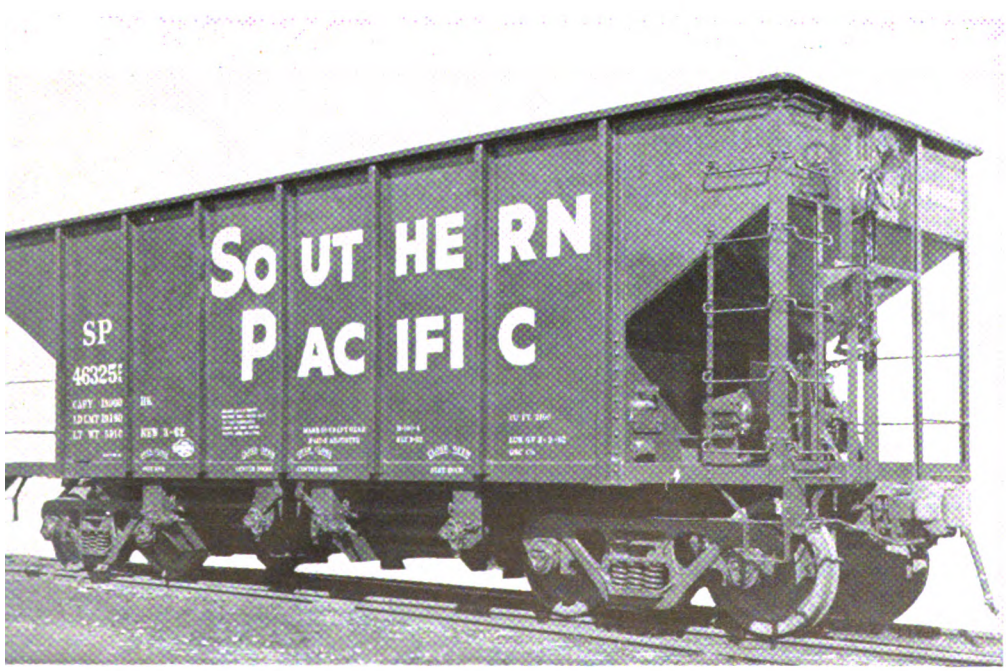
An impact program will be initiated to determine the cushioning capacity of sliding center sills and long-travel draft gears. The Research Center has been assisting the Joint Sub-Committees on Special Cushioning Devices and the Manufacturer's Engineering Committee in setting up standard test procedures for determining capacities and characteristics of these devices. Progress has been made in the development of an AAR hydraulic draft gear.

Studies were completed during the last year on the ability of various coatings or treatments to prevent or reduce corrosion of air-brake couplings, particularly in the gasket groove; on the ability of various arrangements to secure brake wheels on vertical-wheel geared hand brakes under severe vibration; and on the location of angle cocks on 85-ft piggyback cars having Type F couplers and on various cars equipped with long-travel draft gears or sliding center sills having either E or F couplers.

SP Puts 100-Ton Hoppers in Service

Deliveries of 500 open-top hopper cars of 100-ton capacity for the Southern Pacific have recently been completed by Greenville Steel Car Co. Designed by the railroad's mechanical department, these cars are being used to handle heavy bulk commodities throughout the area in the West and Southwest served by the SP.

Cars of this general configuration previously owned by the SP have all had capacities of 50 and 70 tons. "The higher capacity will permit shippers to benefit from incentive rates established by the Southern Pacific to promote heavier loading of freight cars," W. G. Peoples, vice-president of system freight traffic, commented on delivery of the first of the new cars. The new equipment, he added, augments SP's growing fleet of diversified cars.



Car is an all-welded assembly of low-alloy, high-tensile steel. Light weight is 59,100 lb.

The 2,100-cu ft car is fitted with four pairs of individually operated, longitudinal hopper doors. Selective unloading, possible with this door arrangement, allows consignees to discharge materials into bins or conveyors between the rails, or at either side of the track.

The body is an all-welded structure with riveting used only for the connection of the side stakes at the bolsters to the body-bolster web plates. The LAHT side sheets are 5/16 in. thick. Inside length of the carbody is 31 ft 11¼ in.; inside width, 9 ft 7⅝ in. Pressed side stakes are welded to the exterior of the carbody. Extreme width of the car over these stakes is 10 ft 4⅞ in. Height of the car over top chord is 12 ft. Draft gears are the Mark 50 high-capacity friction type.

The car has 100-ton narrow-pedestal trucks with 6½ in. x 12 in. roller bearings. Complying with the latest AAR requirement for all cars of 70-ton capacity and over, wheels are 36 in. diameter. They are of the multiple-wear, wrought-steel type.

The cars are AAR Type HK—self-clearing, with longitudinal hopper doors. While the SP has previously operated over 2,700 of this type of hopper car, all have been of 70-ton capacity.

D&RGW and SP making tests . . .

Hydrodynamic Brake in 2,000-hp Drive

The hydrodynamic transmission is not inferior to any other type of transmission in its ability to transmit high horsepower, Dr. K. Fritz Kugel, director of West Germany's Voith Getriebe, stated last month. Voith was the manufacturer of the drives used on the 4,000-hp diesel-hydraulic locomotives built by Krauss-Maffei in Germany last year for the Denver & Rio Grande Western and the Southern Pacific (RL&C, Sept. 1961, p 23). The six units are now undergoing tests in regular main-line freight service on mountain routes of these two railroads. Each locomotive has two of the Voith L8-30rU transmissions, individually driven by Maybach engines. These transmissions incorporate a hydro-dynamic braking arrangement.

Dr. Kugel told the May meeting of the National Railroad Lubrication Council in St. Louis that only space and weight limitations could set the power transmitting capacity of a hydraulic transmission. These same limits apply to all transmissions, and other types may also be restricted by thermal considerations—limits on the rate of heat dissipation. Cooling of the operating fluid need not be a restriction in hydrodynamic transmissions, he said.

A hydrodynamic power transmission, based on the Fottinger principle, consists of a centrifugal pump which receives the horsepower generated by the prime mover, accelerates and delivers fluid masses to a turbine. In this turbine the fluid masses are decelerated and the energy of flow is transformed back into mechanical energy, which is available at the output end.

The basic concept of a hydrodynamic power transmission is a pump connected to a separate turbine through piping and with both having a common reservoir containing the operating fluid. Based on Fottinger's invention, the pump inpeller and turbine runner are placed in close proximity, forming a common closed circuit. High efficiency, reasonable space requirements and low weight result from this arrangement in which spiral cases, piping, and a separate reservoir can be eliminated, minimizing frictional losses and losses due to the conversion of velocity energy into pressure energy and vice versa.

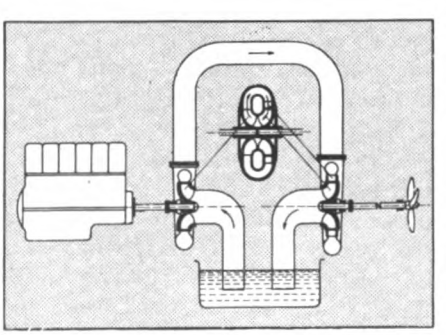
Hydrodynamic power transmissions involve both hydraulic torque converters and hydraulic couplings. Torque conversion, a difference between input and output torques, requires a third reaction member in addition to the pump impeller and turbine runner. This reaction member, a stationary guide wheel, absorbs the difference between these two torques. Hydraulic couplings have only the impeller and turbine, and so there can be no torque multiplication through them.

The behavior of a converter is similar to that of a d-c series-wound motor. The torque converter can be compared to a stepless change-speed gear in which speed and torque of the driven shaft are automatically matched according to the load.

There are a series of basic laws governing the hydrodynamic transmission of power. If the pump speed varies:

- The turbine speed varies directly with the pump speed;
- The torque transmitted varies as the square of the pump speed and the fifth power of the diameter of the rotors;
- The power transmitted varies as the third power of the pump speed and the fifth power of the diameter of the rotors.

As with all machines of this basic type, the efficiency depends upon the dimensions, the smoothness of the blading surfaces, and the viscosity of the working fluid. The ratio of turbine speed to pump speed for which the torque converter has been designed—the ratio for which the efficiency is to be a maximum—plays an important role. Efficiencies of 90% and above can be attained.



Basic concept of hydrodynamic power transmission consists of separate pump and turbine. In practice these components are combined.

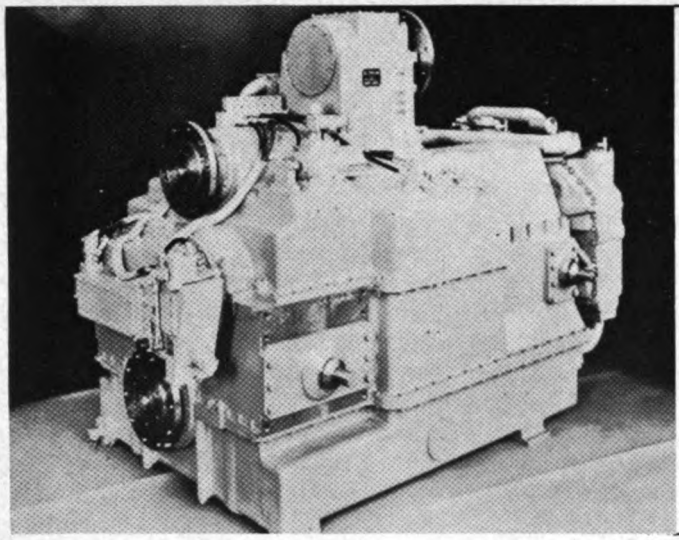
In addition to the torque converter which has been discussed, there are other types which differ in the number of blade rows, the sequence of pump, turbine and guide wheel blade rows, and the ratio of turbine speed to pump speed for which the blading can be designed and at which the efficiency will be an optimum. The heat losses in a torque converter are usually dissipated by an external cooler through which the working fluid is circulated.

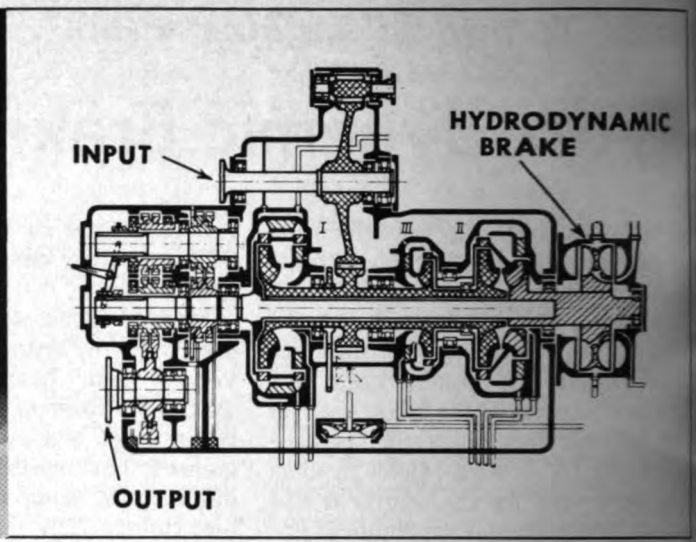
Hydraulic Coupling

The hydraulic coupling has only two members—a pump and a turbine. Under all operating conditions the pump torque is equal to the turbine torque and efficiency is given by the ratio of turbine speed to pump speed. The difference in speeds is called slip, and the hydraulic efficiency of the hydraulic coupling can also be expressed as 100% minus slip in per cent. With increasing slip, the torque that can be transmitted increases, while, with the turbine runner at a complete standstill —equivalent to 100% slip—torque reaches its maximum value. In all other respects, the same laws apply to the coupling as to the torque converter. The normal, or rated, torque should be transmitted by a hydraulic coupling with a slip of 2 to 3%—with an efficiency of 97 to 98%.

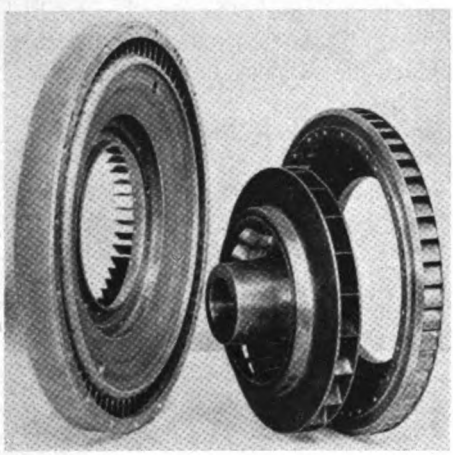
If the drive of a locomotive is to produce high starting tractive effort as well as high maximum track speeds, several speed ranges are required. This could be accomplished by using torque convertors or with a hydraulic coupling followed by a multi-stage gear.

In Voith hydraulic transmissions, there is a separate hydraulic circuit used for each speed range. Usually there are three circuits—either two torque converters and one coupling, or three torque converters. To obtain consecutive speed ranges, these hydraulic circuits may have different





Transmission of the L8-30rU type used on American locomotives, is the first to incorporate hydrodynamic brake. It consists of three torque converters and gearing for reversing and changing the speed range of the locomotive. Locomotive auxiliaries are driven from shaft on top of the unit. Housing of transmission serves as the oil reservoir for both the torque converters and for the hydrodynamic brake installed at end. Transmission is mounted in locomotive carbody and drives to trucks through Cardan shafts.



Torque converter parts are (from left) fixed guide wheel, pump impeller and turbine runner.

blading along with gearing having different step-down ratios.

A typical Voith hydraulic transmission with three hydraulic circuits will have, at the input end, a step-up gear which increases the speed of the primary shaft on which are the mounted impellers for all three hydraulic circuits. One torque converter is used for starting and slow-speed range, while the second and third converters cover the medium and high-speed ranges.

The different hydraulic circuits are energized and de-energized—filled and emptied—by a small filling pump driven off the primary shaft. The distributing valve controlling the filling and emptying of the hydraulic circuits performs automatically, governed both by locomotive speed and engine output. During the changeover from one hydraulic circuit to the next, the one circuit empties while the other is filling. With this overlapping, there is practically no interruption in tractive effort at the changeover points. All gears remain in constant mesh. No synchronizing of claw clutches and no friction clutches are involved.

High Power Transmission

Because of the restricted space available in locomotives of high horsepower, a simple and compact Voith transmission has been developed. The consecutive speed ranges are covered by three hydraulic circuits which differ from one another only in their blading. With this arrangement, the number of gears could be reduced to a minimum. The efficiency could also be improved.

Transmissions of this type, which were originally developed for an input of 1,300 hp, have two torque converters and one hydraulic coupling. In addition to the reversing gear, these transmissions have a speed-range changing gear so as to meet the requirements both of low-speed and high-speed service. The V.100 locomotive of the German Federal Railway is equipped with this type of transmission (RL&C, Sept. 1960, p 28).

Because the diesel-hydraulic locomotives for two U.S. railroads have the high axle loadings—23 tons, it is possible to transmit high starting tractive efforts. The Voith transmissions for them have been equipped with three torque converters. One of the reasons for the choice of the hydro-dynamic power transmission has been the hauling of heavy trains over the Rocky Mountains. These trains must be started readily on steep and long grades. Under such starting conditions, the hydrodynamic power transmission can absorb and effectively dissipate the heat developed.

Another point in favor of diesel-hydraulic traction was the use of hydrodynamic braking on down grades. The hydrodynamic brake produces heat which is absorbed in the operating fluid. As during normal traction, this heat is dissipated in a heat exchanger to the engine cooling water where it can readily be handled by the existing engine-cooling equipment.

The Voith hydraulic transmission with hydrodynamic brake has a common oil circuit. During braking, the idling speed of the engine is sufficiently high to drive both the filling pump of the transmission and the fan of the cooling equipment. Regulation of the hydrodynamic brake is achieved by varying the oil filling. Oil is circulated through the heat exchanger by the rotor of the hydrodynamic brake. The hydrodynamic brake has been designed so that the maximum braking effort equals the tractive effort for much of the locomotive's speed range.

For converter operation, the efficiencies are 86 to 87%, measured between input flange and output flange of the complete hydraulic transmission. If this transmission is equipped with hydraulic couplings, the efficiencies reach 94%. Dr. Kugel pointed out that more than 10,000 Voith transmissions with an aggregate rating of over 4,000,000 hp have been installed in rail cars and locomotives.



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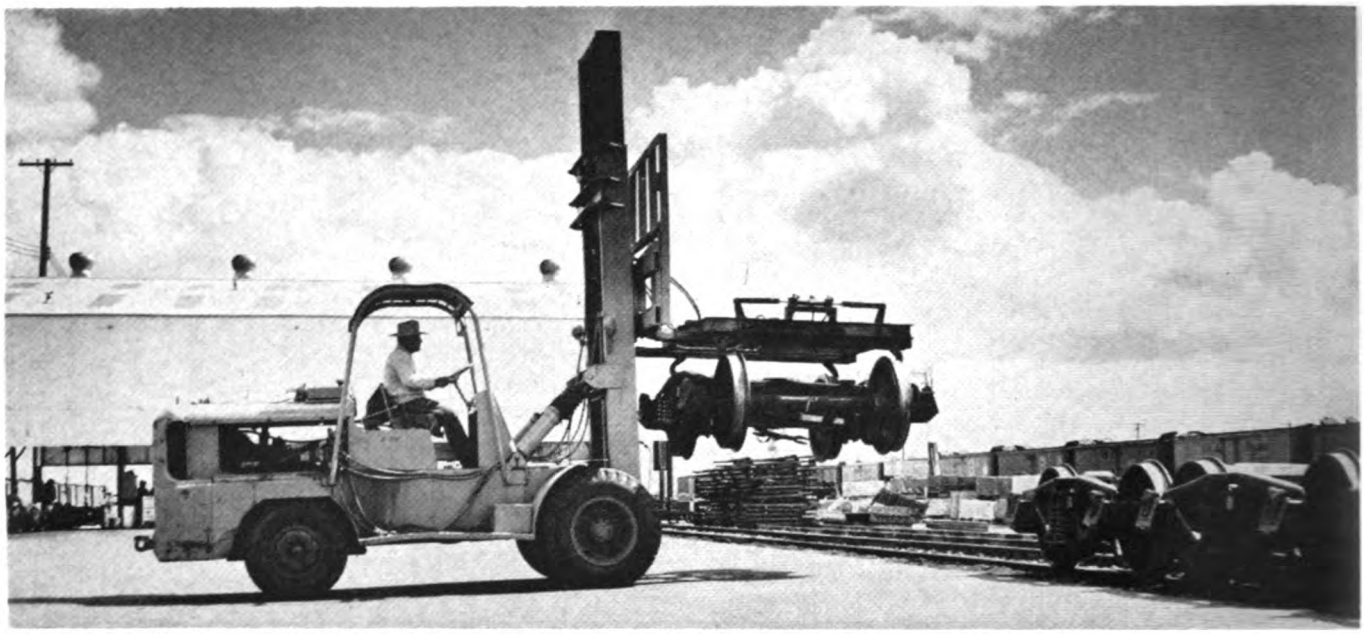
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Completely rebuilt truck, for installation on a car undergoing repair, is lifted from outbound storage track leading from the shop.

PFE 'Unit Exchange' for Car Trucks

Pacific Fruit Express is now exchanging car trucks rather than overhauling and reinstalling the same trucks on refrigerator cars which come to its repair facilities at Roseville, Calif., and Tucson, Ariz. This procedure permits more prompt release of cars, along with assuring that thoroughly upgraded trucks will be in service.

In 1959, after surveying its operations and the growing demand for refrigerator cars suitable for higher train speeds, Pacific Fruit Express developed a truck-repair and exchange system at Roseville car shop. The system was based on the principle of installing previously reconditioned trucks instead of repairing and reusing each car's own trucks, such repairs having previously been made throughout the yard. The new system is more economical, expedites car repairs, and makes possible the complete upgrading of trucks at the time of wheel changes or when other repair work is being done.

In a centralized truck overhaul shop, the work can be done on an assembly-line basis, with quality control rigidly maintained. Along the actual car-repair tracks, congestion is reduced and delivery of materials is simplified. All truck-repair materials can be handled and stored in a relatively small area. Tools and repair equipment are also concentrated in one area where operations can be more closely supervised.

Following the initial development at Roseville, the first truck-overhaul facility especially designed for this assembly-line procedure was placed in operation at the PFE shop in Tucson in 1960. Among the features which contribute to production and efficiency are the hydraulic hoist for raising trucks to be dismantled; the special jib, gantry and overhead traveling cranes; the automatic wheel lift; the overhead booms for oxygen and natural gas lines; and the overhead reels for water, air, and lubricants.

The prefabricated steel building which shelters the operation is 60 ft x 72 ft and has 60-ft x 30-ft paved aprons on each side for material storage. Materials can be moved in and out of the building by fork-lift trucks or with the traveling overhead crane which covers the aprons. The shop has two tracks—one inbound for dismantling trucks and one outbound for assembling. The inbound track has storage room for 21 trucks which feed into the two tear-down spots, and the outbound track holds the same number of rebuilt trucks after they roll off the second of two assembly spots. The two work spots on each track are inside the shelter.

When inspectors find cars having trucks requiring repairs, the trucks are replaced with rebuilt trucks of the same type, coming directly from the assembly line, or from a reserve pool. Bad-order and overhauled trucks are moved by a 7½-ton fork lift, equipped with a PFE-designed hydraulic handling attachment which allows the operator to pick them up and place them on tracks without assistance. This attachment clamps the truck firmly, allowing no unsafe swaying while it is being moved. At Roseville, a modified straddle carrier is used to handle trucks to and from cars.

After a bad-order truck has been placed on the inbound dismantling track, the first step is to pump all free oil from the journal boxes into drums stored on nearby pallets. Cotter keys, U-cotters, sliding chair bolts, and other hardware are cut loose with torches prior to rolling the truck into the shop where it is stopped at the D-1 spot over a hydraulic lift. The truck is raised so two carmen assigned to this spot can cut various pins and bolts from underneath, simplifying the dismantling. The truck then is lowered and parts, such as brake rigging, are removed, sorted, and graded. These components are placed on skids and pallets for movement to the assembly side of the shop, to a reclamation area,

or to the scrap dock. Parts such as loop hangers and pins, which cannot be graded visually, are thrown on a sorting table to be checked and gaged later by an inspector.

Because only new brake shoes and brake-hanger wear plates are applied to reconditioned trucks, those still serviceable when taken from trucks are moved to the light repair yard for reuse. Brake levers which are reusable are taken to the heavy-repair yard for reapplication. It is not practicable to apply levers on trucks on the assembly line because the braking requirements of cars to which the trucks will eventually be applied are not known.

Trucks are moved to the D-2 spot for completion of disassembly by another two-man crew. A gantry crane hoists the side frames and bolster simultaneously to permit removal of truck springs, spring plates, wedges, journal bearings, and lubricating pads. Springs are placed on a gaging table where they are checked for free height prior to sorting into trays. Wedges needing recambering are transported in drums to a nearby press. After being reclaimed, these wedges are returned to assembly Spot A-1.

As journal bearings are removed, they are placed in a special 36-pocket skid. When the skid is loaded, it is moved by a fork lift to a solvent tank where dipping removes oil and dirt prior to rebroaching. This PFE-designed dipping skid has eliminated several manual handling and cleaning operations. Lubricator pads are moved to a pad-washing machine in the back shop where they are washed, repaired, soaked, and placed in containers for return to the A-1 spot.

Side frames and bolsters set outside shop by the overhead traveling crane are transported to the welding shop for repair and for the rebuilding of wear surfaces. They are then returned to the side-frame and bolster pool.

While some wheel sets can be reused, approximately 80% must be moved to the wheel shop from the D-2 spot. They roll down the track to an automatic wheel lift which places them on an elevated track along which they move by gravity through a small retarder into the wheel shop for contouring or scrapping. The 20% which are immediately reusable are moved by a monorail hoist to one of the "wheel garden" tracks adjacent to the overhaul shop, or through to the assembly track. This monorail system is used primarily to move various sizes of wheels from storage to the inbound assembly track.

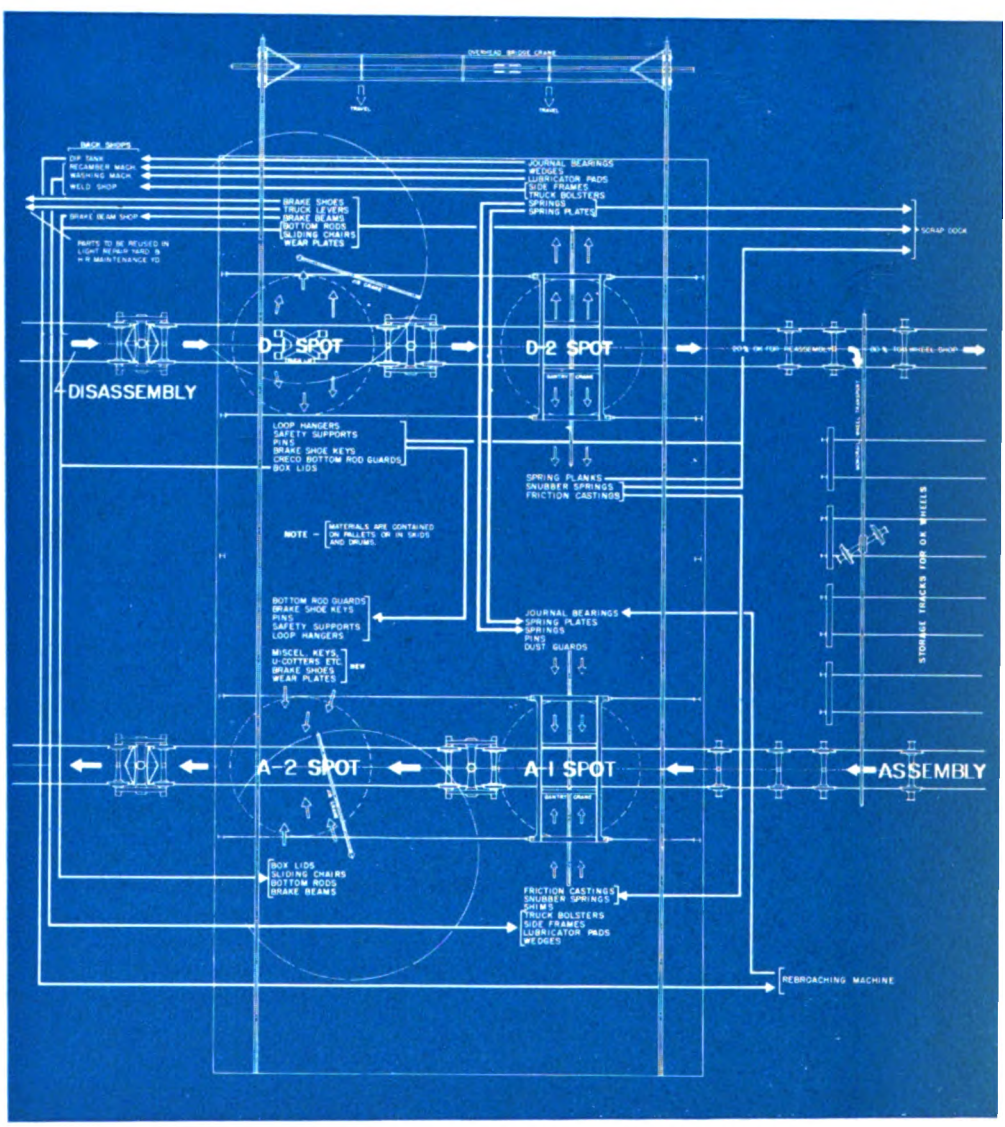
Division of work on the two dismantling spots has been equalized as much as possible to maintain uninterrupted production, while allowing the necessary sorting tables and material containers to be stationed at convenient locations. At Spots 1 and 2 the truck components are placed on or in eight pallets, seventeen basket and special skids, three scrap dump skids, and five drums.

Truck-assembly operations are also equalized at the two spots, A-1 and A-2. This division of work allows for sufficient material storage so that items required during assembly are available on a self-service basis. To avoid interruption of the production line, all these materials are either new, or have been put in first-class condition. Materials which cannot be restored to like-new condition are reused only in the repair yards.

Two carmen assigned to the A-1 spot start assembling the truck by manually rolling two pairs of wheels into position. Wheels pass under a raised platform which can hold two complete car sets of side frames and bolsters. This platform is kept charged by another workman who utilizes the overhead traveling crane to obtain the appropriate types of side frames and bolsters from a pool maintained on the material storage apron.

With the gantry crane at Spot A-1, the side frames and bolsters are moved into position for application to the wheel sets. Workmen apply lube pads, wedges, bearings, friction castings, and springs. The truck is then moved forward to Spot A-2 for application of safety supports, brake beams, loop hangers, brake shoes, and shoe keys. Thirteen skids, four pallets, and four barrels of materials are required at these two spots to hold all the com-

(Continued on page 42)



Flow of materials has been carefully developed for efficient truck rebuilding operation.

NEW PIGGYBACK VERSATILITY WITH **ACF** LOW-LEVEL ***HITCH HIKER***

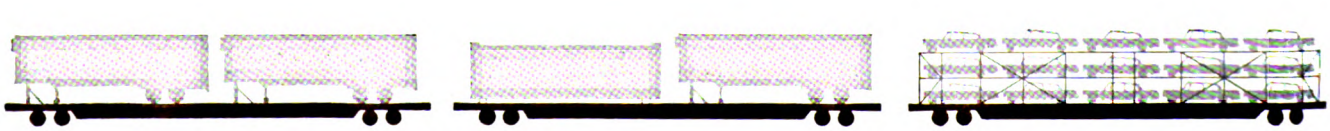
Newest addition to ACF's "Transport Package," the service-proven Low-Level Hitch Hiker flat car adds new dimensions to piggyback operations. This car offers piggyback shippers and carriers the advantages of a low, low profile that eliminates clearance problems and provides 5-way versatility:

- **with ACF Trailer Hitches will carry two 40-foot trailers.**
- **with ACF Cushion Cradles will carry two 40-foot containers.**
- **will carry a trailer and container simultaneously.**
- **will carry auto racks.**
- **flush deck permits conventional flat car service.**



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- **compatible with flat cars of different deck heights and will negotiate the same curves.**
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- **outside width 8' 10", inside width 8' 2".**
- **comes equipped with two ACF Trailer Hitches.**
- **negotiates a 16° curve coupled to a standard box car.**
- **ruggedly built for minimum maintenance.**





By eliminating the clearance restrictions previously imposed by many tunnels and bridges, the new ACF Low-Level Hitch Hiker opens new track miles to piggyback operations. The low, low profile of this unique flush-deck flat car enables any size trailer, any size container or any auto rack to be shipped to virtually any destination – faster, more economically than ever before. By thus extending the scope, flexibility and mileage of piggybacking, the outstanding ACF Low-Level Hitch Hiker flat car is helping industry achieve greater savings in shipping costs.

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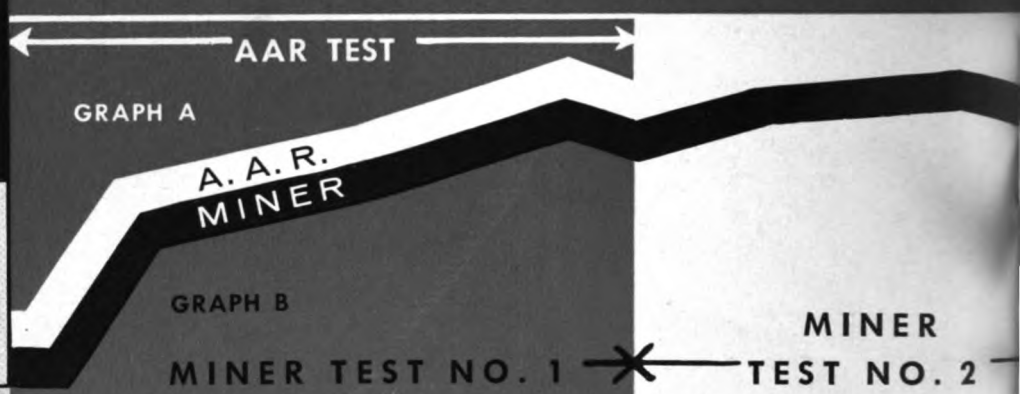
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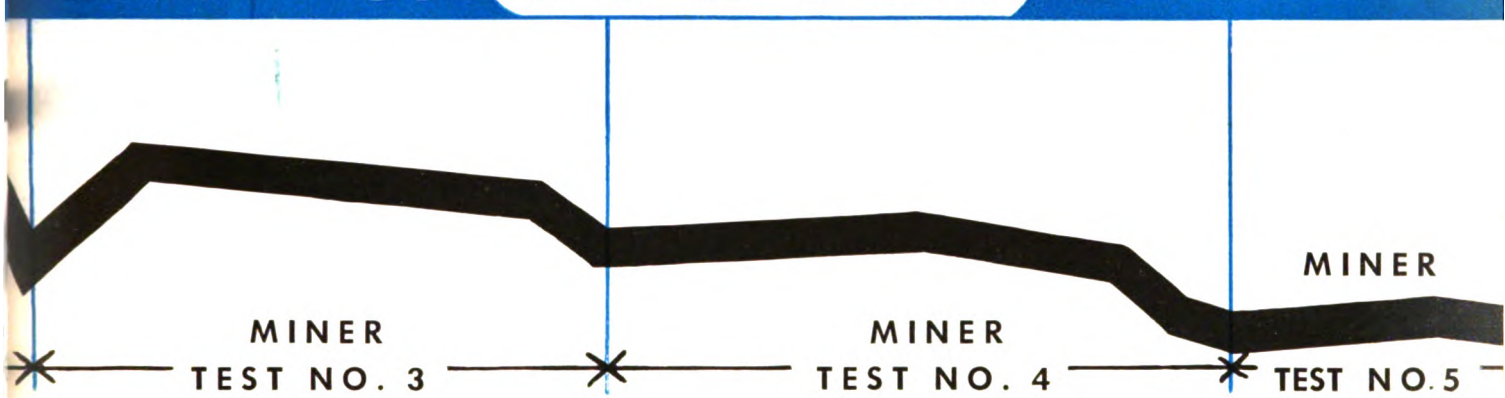


RF-361

DRAFT GEAR

FOR FREIGHT SERVICE

PROOF OF L-O-N-G-E-R LIFE



Graph A indicates the average performance of the Miner RF-361 Rubber Friction Draft Gears during the A.A.R. certification tests.

• OFFICIAL CAPACITY 41,400 FT.-LBS., AT RATING TRAVEL • Final calibration after sturdiness test 53,800 FT.-LBS., AT RATING TRAVEL • Final calibration after sturdiness test 61,700 FT.-LBS., AT MAXIMUM TRAVEL

Graph B illustrates a test conducted simultaneously at the Miner laboratory on five RF-361 Gears, resulting in identical performance with the A.A.R. official test. At the conclusion of Miner Test No. 1, because of the excellent condition of the gears, it was decided to continue testing. Four additional endurance and sturdiness tests in accordance with A.A.R. procedure were given these gears. Total work input was more than 150,000,000 ft.-lbs. The continuing graph after Miner Test No. 1 shows these results; and it is particularly noteworthy that throughout these additional tests the capacities of the gears were maintained above the A.A.R. official capacity rating. The amazing endurance and sturdiness qualities of the RF-361 were achieved by the introduction of revised metallurgy and the metallic lubrication system, which means much longer draft gear life with greater protection to cars and lading.

W. H. MINER, INC. CHICAGO

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1962

72 railroads convert back to Metal Brake Shoes! 68 by April. Now 72. All tested shoes of other types, analyzed the facts, then converted one or more pieces of equipment back to METAL brake shoes. Here are four of the principal reasons these properties converted back to metal:

1. Metal brake shoes cost less.
2. Metal brake shoes are reliable under all conditions.
3. Metal brake shoes cause less wheel wear.
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For dependable, economical braking under all conditions, specify METAL brake shoes by American Brake Shoe Company. They are engineered to take it and give more braking for your brake shoe dollar.

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Over half a century's experience in braking materials: Diamond S Metal Shoes; Comet Composition Shoes

A-886

PFE 'Unit Exchange' for Car Trucks

(Continued from page 35)

ponents for any one type of truck.

When it is necessary to assemble a different type truck, this information is passed to the lift-truck operator in sufficient time for him to exchange those containers of parts which are not interchangeable. Materials required for the various types of trucks used under PFE cars are stored adjacent to the truck assembly side of the shop on pallets and in skids so they can be quickly exchanged without interruption of production.

Movement of palletized truck parts, side frames, bolsters, and scrap is performed by a 3-ton fork lift that also serves the nearby welding shop, annealing furnace, and wheel shop. The driver is directed by radio, meaning that there is little delay in movement of material.

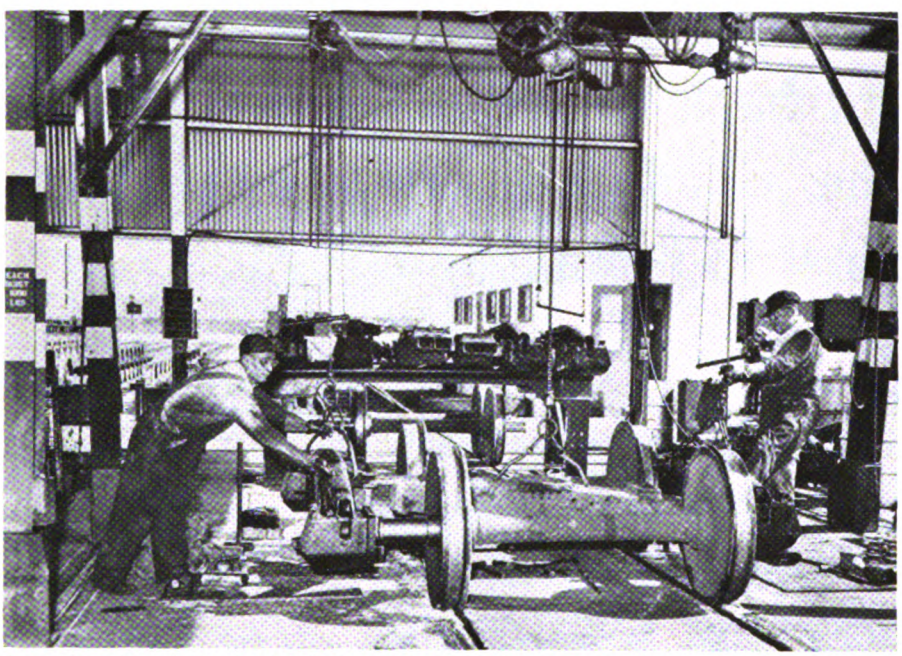
Completed trucks roll out of the building from Spot A-2 on the outbound storage track holding 21 trucks. The truck-handling lift truck takes them either to the point of application in the repair yard, or to a storage area. This lift truck is also radio equipped, speeding delivery of the proper type of truck for each car scheduled for exchange of trucks.

The truck overhaul shop is manned by two-men crews at each of the four work spots and by one lead workman, one carman helper and one laborer, all supervised by a mechanical department foreman who is also in charge of the adjacent wheel shop. Design of the facility permits production and forces to be varied with the work load.

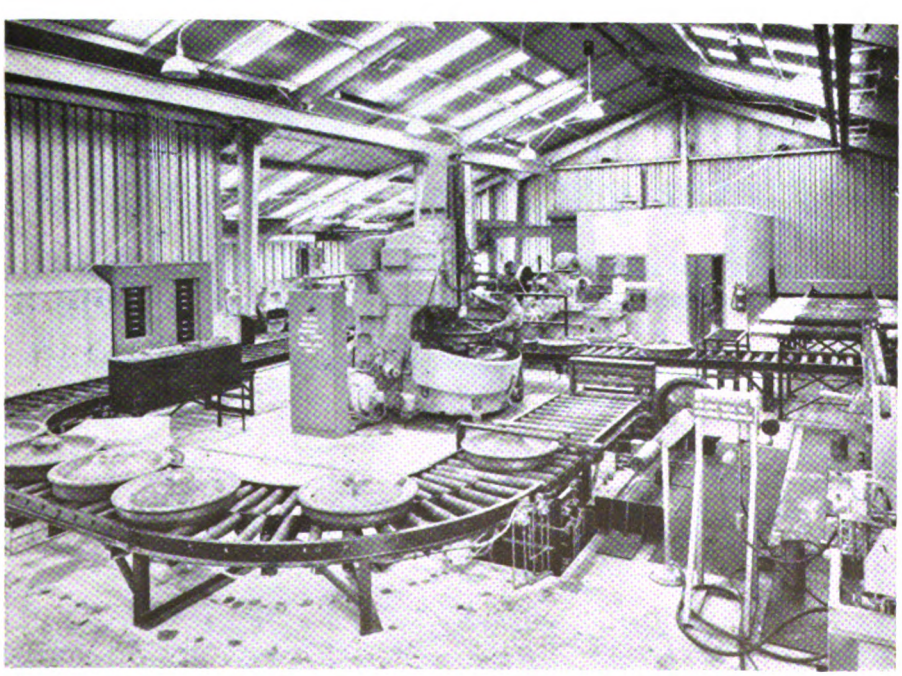
Adjacent to the truck overhaul shop is a new 4,800-sq ft wheel shop which is equipped for working mounted wheels—turning journals and wheel treads, and for production of complete new wheel sets.

Machinery in the shop includes a Sellers 50-in. tread-turning lathe; a gap lathe for journals; a wheel-dismount press with new hydraulic equipment; a dual-end-drive high-speed axle lathe; a boring mill with jib boom; a wheel mounting press with 200-ton double-acting cylinder, and Magnaglo test equipment. In the Tucson wheel shop, 12 to 15 axles a day are Magnafluxed by the wet method.

(Continued on page 48)



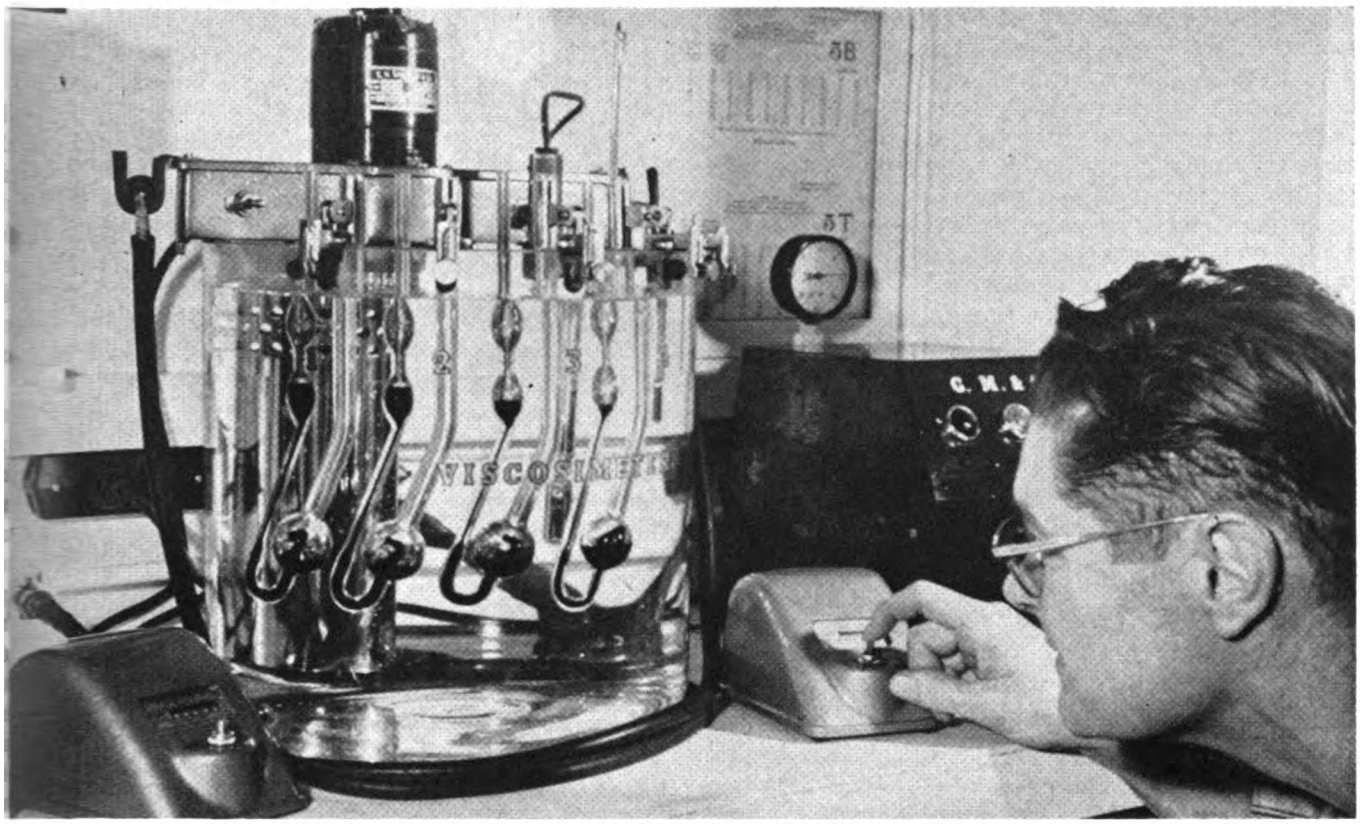
Assembly area A-1 has hoists which simplify the installation of various components. Partially rebuilt truck is then rolled to A-2 position for completion.



Wheel conveyors and axle racks have smoothed flow of materials through the wheel shop. After completion, wheel sets are placed in storage or sent to position A-1.



Dipping skid is arranged to hold 36 solid journal bearings. It has speeded cleaning.



scosity test is part of regular lube-oil examination made at GM&O locomotive terminals. All major terminals on road have such equipment.

What Can Diesel Lubricating Oil Tell?

Test engineers agree that much can be determined about engine conditions. Accurate interpretation is necessary

Objectives of maintenance pro-ams based on the analysis of lubri-ting oil from diesel engine crank-ses and the analytical methods used different railroads were discussed st month in St. Louis by the test en-neers of six railroads. This panel as the feature of the session of the ational Railway Lubrication Coun-l, an affiliate of the American Soci-y of Lubrication Engineers which as holding its annual meeting in St. ouis.

Railroads of different lengths and aving different types of operations ere represented. Panel members ere R. A. Bardwell, engineer tests, &EI; V. C. Barth, chief metallurgist d engineer tests, C&NW; M. Her-g, engineer tests, Frisco; R. N. John-n, engineer tests, EJ&E; W. E. asky, engineer tests, GM&O; and . A. Tennyson, engineer tests, SLSW. hairman of the session was A. C. encer, Jr., Marketing Division, umble Oil & Refining Co.

"Any abnormal oil condition is usually accompanied by an abnormal engine condition," Mr. Bardwell of the C&EI said. "Intimate knowledge of the diesel engine's parts and their composition, its immediate past history based on used oil analysis, and past experience with engine failures are needed to correlate current laboratory tests . . . At times analysis of parts is necessary to supplement this correlation. The wide variety of failures and the new conditions which constantly appear make routine testing of used oil much more interesting than it might seem at a cursory glance."

Mr. Bardwell went on to define, in decreasing order of importance, those impending engine component failures which might be detected by oil analysis. These parts are main bearings, camshaft bearings, piston rings, cylinder liners, and other engine parts. Periodic analysis can also show when lubricating oil is becoming contaminated or is deteriorating, he said.

Periodic examination of oil samples can warn that an engine defect exists and, with this information, corrective steps can be taken before an engine failure occurs, Mr. Herzog of the Frisco explained. He stressed the importance of the man interpreting oil test results.

The crankcase oil can indicate if one or more of the following engine conditions exist: Fuel leaks; cooling water leaks; improper functioning of lubricating oil filters; inefficient air filters; poor combustion; oil oxidation; bearing damage; abnormal wear of chrome plated liners; abnormal wear of piston thrust washers; depletion of oil additives; bent A-frames; dirty oil coolers; "dragging" of blower rotors; broken or stuck piston rings; and corrosion or wear of silver-coated wrist pins or bushings. Examination can also tell if the oil is suitable for further service and if a recent oil change has been made.

Many of these conditions, if allowed

to persist, endanger the engine. Their early detection and correction are important. A few of these engine defects can be easily and positively identified by simple test methods. The majority, however, require chemical analysis of the oil by spectrographic or other methods. To specify most of these defects, the man interpreting the test results must have the history of the engine, including dates when bearings were changed, oil cooler cleaned, oil changed, rebuilt engine installed, and record of accidents and failures. He must also know of the installation of special engine accessories, such as special oil and air filters, or of magnets in the oil system. The use of special liners or rings must also be known.

The pinpointing of engine defects by means of crankcase oil tests is not an exact science. There is plenty of room for mistakes. Interpretation of some test results is simple—a drop in viscosity shows dilution of the oil with fuel; chromate or borate in the oil means that there is a leak in the cooling system which allows water to enter the crankcase. For many defects, correlation between oil properties and engine condition is not so easy. For these, the deciphering of oil test involves variations in wear-metal ratios, gradual departures from normal oil patterns, or slight changes in blotter-spot appearance and viscosity trends. "There are no go and no-go rules to serve as guides," Mr Herzog observed.

The success of an oil-control program is determined by the man who translates test results into demands for corrective action. If he reports defects which are not found when the locomotives are inspected, or if engine failures repeatedly occur which he should have been able to forestall, confidence in his predictions will soon be lost. He must observe seemingly minor details and discrepancies to avoid being stampeded by test results of "freak" or improperly marked samples which inevitably are received. He must develop a sixth sense for "just how far is safe" when the oil tests reflect a potentially dangerous condition. Such interpretation involves more than his technical knowledge about oil, fuel, and engines.

There are two requirements without which no crankcase oil control program will work, Mr Herzog concluded. One is that examination of oil samples must be completed as soon as possible after samples are taken from the crankcase, and recommended action passed to maintenance supervision promptly. This must be done on the same day that samples are received for examination. There is nothing "more useless" than test results of oil samples which are several days old. The second essential is confidence in the program on the part of the mechanical supervision responsible for maintaining the engines. If these men place no reliance on the recommendations of the man interpreting the oil tests, the program will never get off the ground and is a waste of time. This confidence, of course, must be earned.



Control cabinet at GM&O terminal has all devices and supplies for making diesel-pit crankcase oil examination and for checking cooling water. Basic instruments are viscosimeter and water detector. Data is posted on cabinet doors.

Quantometer Analyses

The use of a Quantometer for analyzing a large number of oil samples was discussed by Mr. Barth of the C&NW. The equipment, which he called the "watchdog" of the road's diesel fleet, is located at its central Chemical Laboratory in Chicago. The North Western, first railroad to use the Applied Research Quantometer, has been gratified at the speed with which oil samples are analyzed by this direct-reading spectrographic device.

The C&NW operates approximately 750 diesel locomotives. Weekly lubricating oil samples are taken from each road unit; monthly samples from each switching unit. To cover this fleet, 2,500 samples must be analyzed monthly by the Quantometer, approximately 100 samples per eight-hour day. One operator makes the analyses, while a second man aids in calculating readings and tabulations.

The sample of oil is placed in an aluminum boat 3½-in. long, ¾-in. wide and ⅜-in deep, under the "rotrode," a rotating electrode which picks up the sample of oil and carries it to the arcing zone where it is ignited for diffraction. The method totally eliminates the time-consuming ashing technique and yet gives "exceptional sensitivity" and accurate results.

After approximately 60 seconds the Quantometer records results in parts per million on a Leeds & Northrop recorder. From these results final readings are taken, indicating the condition of the engine. Should there be indications of some improper engine condition, a sample can be rechecked in a matter of minutes. Standards can be analyzed frequently to determine whether the instrument is functioning properly, insuring reproducability.

Filter Evaluation

Mr. Barth also presented information on lubricating-oil-filter evaluation. It has generally been found that laboratory and field service tests should be run simultaneously. A group of engines can be selected and filter performance can be determined by the condition of the lubricating oil as found in the laboratory. In most instances, the pentane and benzene-alcohol insolubes have been most helpful. Viscosities and acid or base numbers also aid considerably in filter evaluation. Both help in the detection of abnormal conditions such as increase in viscosity, excessive oxidation, or accumulation of carbon. While effectiveness of the additive can also indicate the efficiency of filtration, no reliable means has yet been found that will evaluate such additive activity.

Filters undergoing engine tests should receive careful examination upon removal. Usually this involves determination of weight of accumulated sludge, the nature of this sludge, time in service, and evaluation of the filter's construction. It has been the practice to obtain the dirt load by comparing it with a new filter, soaked in lube oil and drained for a specified time period, to establish the base.

There are two general types of filters used in most railroad engines, the cotton-waste or cotton-linter type and the paper type. While the cotton-waste type has very good performance characteristics, certain types of paper filters have been found to be even more efficient because of their full flow characteristics and the longer life. Various types of filter papers differ widely in their ability to remove different sizes of contaminating particles and also in their ability to remove soot carbon particles.

Cotton filters tend to give the oil a good appearance but are initially inefficient in removing large particles because of "channeling" in cotton waste and the lack of uniformity in construction. Cotton waste filters have a low flow rate and, therefore, considerable by-passing of lube oil is encountered at full engine speeds.

Field tests involved installation of pressure gages on inlet and outlet sides of the filter housing. When pressure differential reached 18 psi, the approximate setting at which by-pass valves open, the loading of the filters had reached a point where full flow no longer existed, the end of the filters' useful life.

In the C&NW test, pleated-paper cageless lube oil filters were applied to three EMD locomotives, GP-9 freight units with 1,750-hp "C" type engines, operating in fast heavy duty freight service. The units operated approximately 10,000 miles per month and the lubricant was a refortified, re-refined SAE 40 oil.

Filters were of the so-called "cotton-faced" type with properties of soot-carbon absorption similar to those of cotton waste. They do have the full-flow properties of paper filters. They were rated normally at 5 to 10 micron minimum particle size pickup. The paper used in construction was 160-lb weight, with a total of 7,200 sq in. of filtering area per filter. The finished filter was approximately 6 in. in diameter and 30 in. in length, with four filters in parallel being used on each engine. The test was conducted from late summer through the following winter. Filters were changed when pressure differential reached approximately 18 psi, measured by the gages installed on the filter tank.

Composite results for the three units, showed that filters went off of full-flow after approximately 30 days. Some filters were allowed to operate longer than 30 days to observe the rate of build-up of contaminants in the lube oil. Differential pressures were measured at approximately 165 deg. F. oil temperature, with engines operating at full speed. It was found that cotton-waste filters when new will by-pass about 80 percent of the oil. Initially they operate above the 18-psi by-pass pressure in most instances. In general, the sludge pickup of each paper filter during this test run averaged 12 lb.

Typical laboratory analyses of samples taken during the test indicated that the filters were quite effective in reducing soot volume in the oil, while the oxidation by-products remained rather high. This is typical of all lube oil filters, whether of paper or cotton waste types.

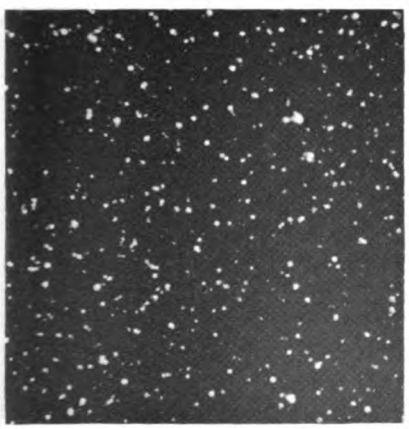
Dark Field Microscopy

For maximum engine cleanliness and lowest filter maintenance, it has been observed that the time to change oil is when significant agglomeration, massing of particles, is shown in the oil sample. An instrument which has been used successfully by railroad laboratories to detect such conditions is the dark field microscope which was discussed by T. A. Tennyson of the Cotton Belt. A thin film of oil is observed under conditions where the source of light is arranged so that no direct beams enter the barrel of the microscope. The only light which can be seen through the eyepiece is that reflected from the particles suspended in the oil under examination. The field is dark and the particles show up as points of light. A definite indication of loss of additive effectiveness can be detected when the finely dispersed particles gather in groups of two or more. This is agglomeration.

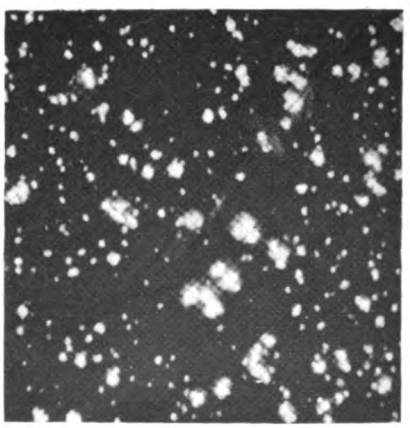
The best possible condition exists when all particles observed in the dark

Rating Additive Effectiveness

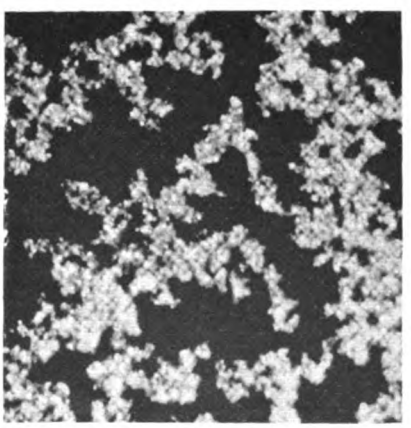
Most railroads use lubricating oils which contain additives, the so-called "heavy duty" types. Time and mileage have not proved completely satisfactory in establishing oil-change intervals. Four years' experience with dark-field microscopy has satisfied the Cotton Belt that this method for evaluating dispersion is effective in telling when such oils should be changed. Photomicrographs at 500 times magnification show typical oil conditions and the ways that they are rated. While 500X magnification does not show details of agglomeration, it tells what needs to be known in order to make oil changes at the proper time.



Good



Fair



Poor

field appear as separate points of light. From practical experience, however, clean engines can be expected even if there is some agglomeration. In actual diesel locomotive operation it has been found that if 10% or less of the particles are observed to be agglomerated, the oil can be considered suitable for further service, its condition rated as "Good" with respect to dispersion. This interpretation does not take into account the actual number of particles, which can be an indication of excessive blowby, but just the approximate percentage of agglomerates.

If more than 10%, but less than 50%, of the particles are agglomerated, then the condition of the oil is rated as "Fair." Experience has shown that this condition is acceptable for continuing the oil in service if the engine can be sampled frequently enough to detect the beginning of serious agglomeration. The observer must learn to evaluate service conditions to determine whether the oil should be changed. When more than 50% of the particles are agglomerated, its condition is rated as "Poor" and there should be an oil change. Changing of the oil should be accompanied by an investigation of the engine itself to determine the reasons for the loss of dispersion.

Since ratings are based on an estimate of the relative number of agglomerates in the oil in relation to the dispersed particles, it is necessary to eliminate those factors which complicate estimation. The most serious is rapid motion of the small suspended particles caused by heat from the source of illumination. Such motion can be practically stopped by using a very thin film of oil under a microscope cover glass, a procedure which also eliminates several other variables.

In the Cotton Belt laboratory, examination of used diesel engine crankcase oil involves the following steps. A sample of used oil is thoroughly mixed and two drops of this oil are transferred to a microscope slide. One drop is covered and the other is left uncovered. A drop of immersion oil is placed on the dark field condenser, and the drop pressed under the cover glass is moved into place and examined under 500X magnification. Dispersion conditions are recorded and indicated action is taken. The uncovered drop is lined up for observation under low power magnification. Indications of water, metals, and dirt in the oil are followed up by other analytical methods. The low-power examination can serve as a screening test for those samples in which the amounts of contaminants should be determined by analytical procedures.

It is desirable to know the trends in wear metals and boron from water treatment. A spectrograph, particularly a direct reader, is ideal for this job. Smaller railroads have difficulty justifying such equipment. Because this information can be valuable to any railroad, some other method must be found to obtain it. Such a method must be rapid and must give reliable results.

If a spectrograph is not available, colorimetric methods can give information on the presence of the more important metals in the oil. The first step is destruction of carbon compounds by ashing a weighed sample. Fifty grams of oil has been found convenient. The ash is dissolved in suitable acid combinations and measured portions are treated to develop distinctive color indications. Generally, a separate ash be run for each metal. Color indications can be measured by a photometer. Metals for which relatively rapid procedures have been developed are lead, copper, iron and boron. Results obtained by colorimetric methods for these metals agree very well with those obtained by spectrographic analysis.

Small Railroad Controls

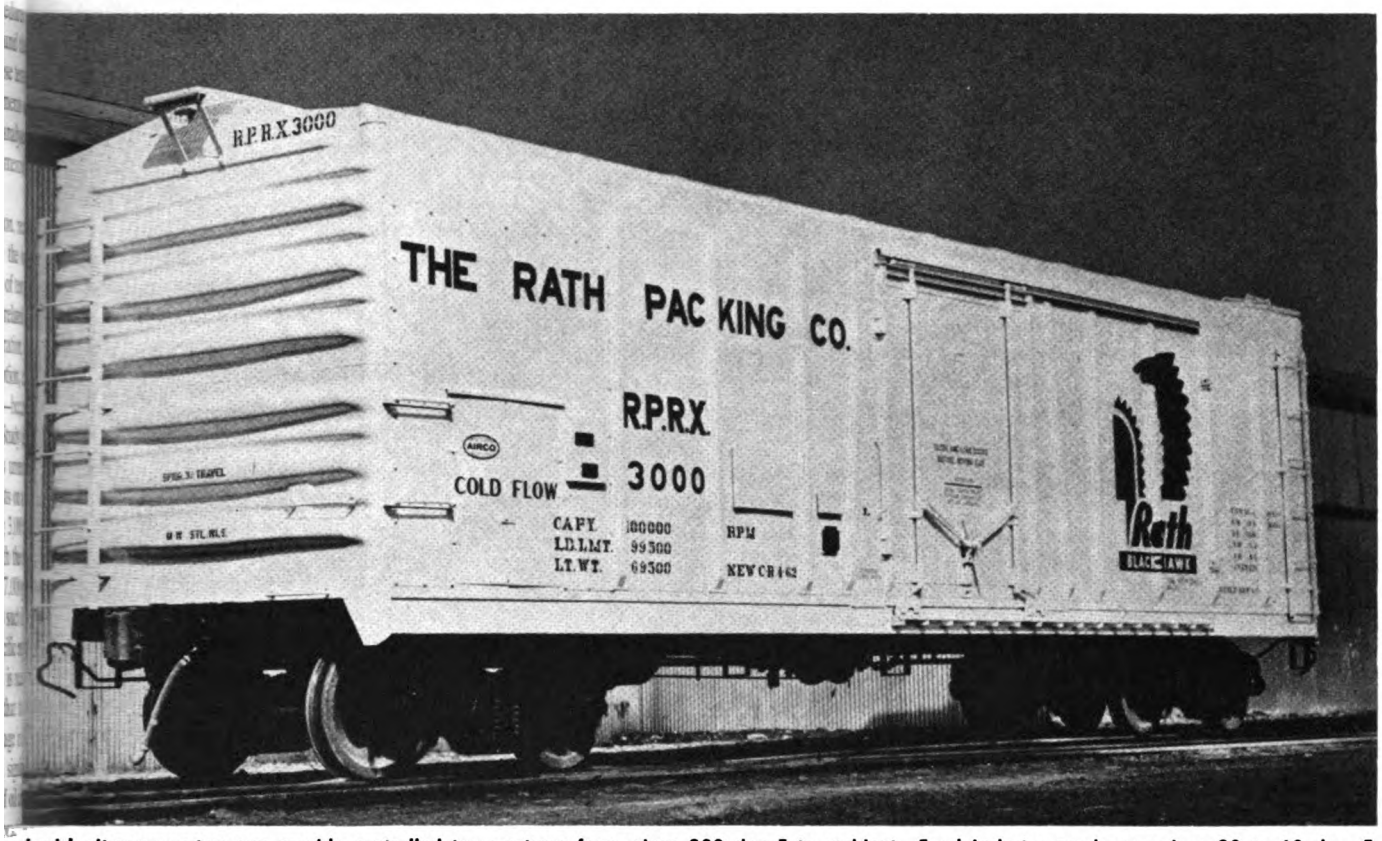
Lubrication oil control on a small railroad was described by R. N. Johnson of the Elgin, Joliet & Eastern. The EJ&E operates between 100 and 150 locomotives. Two thirds are switchers, with about half used for yard work and the other half for industrial switching. Road freight and transfer locomotives operate over a 130-mile line around Chicago. A central yard and the major maintenance facilities are at Joliet. Because the road was among the first to convert to diesel, and this was completed by 1948, a variety of locomotives and diesel engines are involved.

One of the first problems was water and fuel contamination. Tests to control these conditions have been used for many years at each servicing point. As dieselization progressed, with improvements in both engines and lubricants, attention was given to the more complete analysis of lubricating oil as a means for evaluating engine wear and other conditions. Costs of equipment and laboratory procedures for spectrographic analysis and other advanced testing procedures were investigated. It was found that the cost and complexity of these tests could not be justified. Arrangements were made to have complete oil analyses made by industrial and commercial laboratories.

With this information, records were compiled to indicate the long range trends. Interpretation of test data, and the accumulation of related information—hours of operation, mileage, fuel and oil consumption, engine repairs and oil changes—became a full-time responsibility. Study led to the conclusion that it was unnecessary to make complete oil tests on a monthly schedule, representing 3,000 to 4,000 miles of operation with the consumption of approximately 7,000 gal of fuel by a locomotive. Now such data is accumulated only if specific engine conditions indicate that it is necessary.

It has been found that the evaluation of locomotive usage in terms of fuel consumption, is a significant factor in the application of oil controls on the EJ&E. It is the practice to correlate maintenance and repair data. Reports of all oil changes, material tickets for lube oil and fuel, and shop work reports showing details of all repairs and maintenance are used. These are consolidated with the oil test data on a summary sheet for each locomotive. With the enginehouse tests of lubricating oil, the summary of oil conditions, and the operating and engine maintenance data for each locomotive, laboratory control tests are performed each month. Where any unusual changes have occurred, the operating supervisor is advised and extra or supplemental tests are scheduled to conform and correct the unsatisfactory condition. Because oil tests can be taken as frequently as every 100 miles of operation, a very close control can be exercised.

Lubricating controls are practical and profitable on a low mileage railroad because of close contacts with maintenance personnel, supervisors and management, because servicing and maintenance facilities are close together, and because locomotives are available for frequent oil tests. Savings of approximately $10,000 annually have been estimated. As data is developed to evaluate requirements of individual locomotives, additional savings will be obtained. Other advantages will accrue from improvements developed by larger railroads and their experimental laboratories.



Liquid nitrogen system can provide controlled temperatures from minus 300 deg F to ambient. Food industry needs are minus 20 to 60 deg. F.

Nitrogen Cools Rath Meat Reefers

Two refrigerator cars with liquid nitrogen cooling have just been placed in meat service by Rath Packing Co. of Waterloo, Iowa. The cars, equipped with Cold Flow semi-closed liquid-nitrogen refrigeration systems, were built by North American Car Co.

The Cold Flow system, developed by Air Reduction Sales Co., has three primary components: a storage tank for the expendable refrigerant; a heat exchanger piping system to produce equal cooling throughout the car, and a temperature control valve.

The heat exchanger system is composed of finned heat exchanger tubes, each 6 to 8 ft long, mounted compactly in four sections under the ceiling and along the sides of the car. As the control system demands refrigeration, liquid nitrogen flows into the heat exchanger tubes to cool the car's interior. The liquid nitrogen absorbs heat from the car's interior as it boils from its liquid to gaseous phase in the heat exchangers in much the same manner that water absorbs heat in changing to steam. It is then vented into the lading space. When this nitrogen gas is emitted into the car, it produces turbulence and circulation in the interior.



Nitrogen gas from head space in liquid tank is regulated to 20 psi and fed to controller which responds to mercury thermostat. One of these liquid storage (LQN) tanks is in each car.

The desired internal temperature is set on the regulator valve. If the lading-space temperature starts to rise above this setting, the regulator valve opens and admits additional liquid nitrogen into the cooling system. This cycle continues until the temperature setting is again reached. At this point, the valve throttles the nitrogen.

Because the regulator valve does not close completely, unlike on-off systems, a small amount of gaseous

nitrogen continues to vent into the interior. This control method avoids any great temperature changes.

According to Airco, the system not only gives more reliable and consistent refrigeration, but also makes full use of nitrogen's cooling effect, both in the liquid and gaseous state. It can rapidly cool the car prior to loading, pull down the lading temperature following loading, and maintain temperatures en route. In an early test with a conventional Rath refrigerator car modified for use of the liquid nitrogen system, temperatures in the car varied less than 2 deg from the desired 34-deg level during a complete revenue trip. The system's simple construction, compactness, and light weight mean lower capital investment while offering a process without costly maintenance.

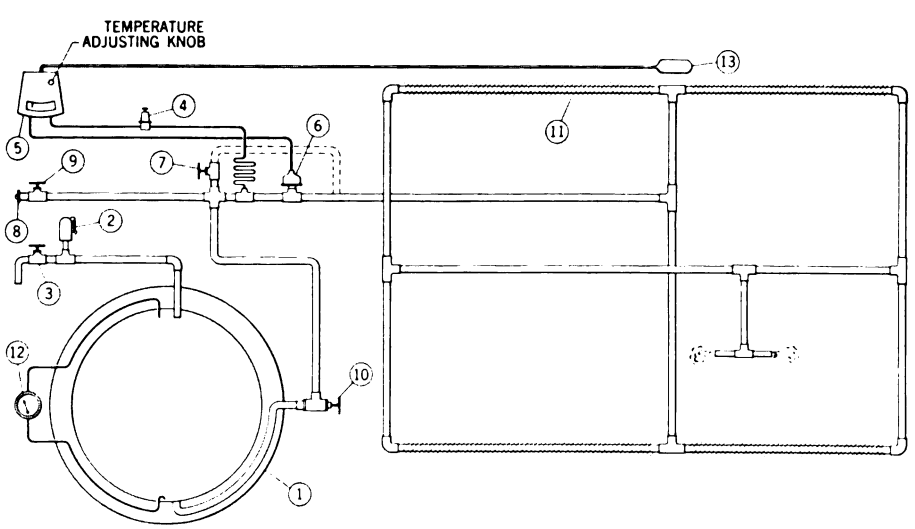
Although the Cold Flow system installed in the prototype cars operates in the 34-deg F range, which is ideal for meat shipments, Airco says it can provide nearly unlimited refrigeration capacity at much lower temperatures. The temperature of liquid nitrogen is —320 deg F. This same system is available also for piggyback trailers and containers hauling perishable commodities and frozen foods.

Two years of research and testing have gone into this semi-closed liquid nitrogen cooling system. J. Gibson, president of Rath Packing, said Rath, North American Car, and Air Reduction began a joint research and testing program in 1960 directed toward developing a practical and more effective means of cooling cars with liquid nitrogen. It was the cooperative effort by the three companies that resulted in the new process.

Both fresh meat cuts and packaged meats were subjected to liquid nitrogen refrigeration shipments during the testing period. Upon arrival at their Rath customer destination points, the meats were in "uniformly excellent condition," the company president said. The liquid nitrogen process, which creates an inert atmosphere within the car and reduces humidity, "has performed most successfully in safeguarding the fresh quality of meat during rail shipments under all types of weather conditions."

The two cars are 40-ft units with a capacity of 1,870 cu ft. The carbody of each is of welded, all-steel construction. Capacity is 50 tons. Meat handling equipment consists of steel cross-rails and wood meat rails. The cars were specifically designed to obtain a low heat loss. Polyurethane insulation, foamed in place, was used because of its low "K" factor. Six inches of insulation were applied throughout. Wood framing is fir, except for meat rails and floor racks which are oak. Lining consists of tongue-and-groove Douglas fir, $^{13}/_{16}$ in. thick on sides and 1½ in. thick on ends. Flooring is 1¾ in. thick. Ceiling is ½-in. exterior-grade Douglas fir plywood.

The 635-gal refrigerant tank is at "A" end of car in a compartment reached through access doors in the car side. Length of lading space is 32 ft 10½ in. Trucks are of 50-ton capacity with 5½x10 journals and roller bearings.



Components of cold flow system are: 1) LQN tank; 2) safety pressure relief; 3) vent valve; 4) pressure regulator; 5) controller; 6) bellows-operated LQN valve; 7) optional by-pass valve; 8) filling connection; 9) filling valve; 10) main LQN valve; 11) heat exchanger; 12) liquid level indicator; 13) sensing element.

PFE Car Trucks

(Continued from page 42)

and an average of 30 a day with a portable unit.

Throughout this 40 x 120-ft shop an extensive system of conveyors moves wheels and axles with a minimum of manpower. Material-handling equipment includes special axle racks and their conveyor, a scrap-wheel conveyor in a tunnel, and a wheel-magazine conveyor to bring new wheels to a roller conveyor leading to the boring mill and mounting press. A 2-ton overhead bridge crane covers the main shop area; a 1-ton bridge crane serves the dismount press and axle lathe.

The sequence of operations for handling wheel sets to be dismounted is an eight-step operation. Mounted wheels are taken from the incoming bad-order track and set into the wheel-dismount press. After pressing, loosened wheels and the axles are moved into the wheel stripper where scrap wheels are lowered by an elevator in the disposal chute for movement by the tunnel conveyor to the outside disposal area. The axle is moved by a fork lift or by the 1-ton overhead crane to the upper level of the axle rack. Axles are then fed into the double-end axle lathe for turning. Finished axles move out of the lathe to the lower level of the axle rack. A cross conveyor moves axles to the Magnaflo room for examination. The axle is then fully Magnafluxed by the wet method. Axles are picked up by a hoist and fed into the Magnaflux unit under control of the operator. Each axle is rotated so the operator can examine all surfaces. If the axle passes inspection, it is demagnetized, tagged for size, and sent out the exit end of the Magnaflux room. If the operator finds a crack, the axle is sent back for further turning until it passes the Magnaflux or must be scrapped. Tested axles move to the assembly storage rack on another cross conveyor. The axle is moved off the rack to the wheel press by a ½-ton jib crane after wheels from the boring mill are applied.

A depressed track has been installed at one end of the wheel shop so box cars or drop-end gondolas loaded with loose wheels can be emptied by a lift truck with a wheel-ram attachment. With this, up to five wheels can be moved simultaneously. Other materials are also unloaded at this site.

Sparks Meets an Old Friend With a New Name

By Gordon Taylor

"What's this thing marked 'transductor' on the wiring diagram?" The speaker was Sam Sparks, an electrician, at Centerville who was working with Bob Brown. They were attempting to familiarize themselves with the GP20 units that were being assigned to their district for the first time.

"Search me," replied Bob. "Under that name I wouldn't know a transductor if I stumbled over one. We'd better check this with Doc Watts and get a clear understanding of what it is and what it does." Sam and Bob took their question to Doc.

"You're wrong about never having encountered a transductor before. You have met and dealt with it under another name," Doc explained. "First, what is a transductor? The locomotive builder says a transductor is, in effect, a d-c current transformer. That doesn't tell us too much. When we consult an electrical dictionary we get two definitions. A transductor is identified as a magnetic amplifier, or a saturable reactor. The second definition gives us an opportunity to learn more about it. The saturable reactor is defined as 'an iron core reactor having an additional control winding carrying direct current whose value is adjusted to change the degree of magnetic saturation of the core. This changes the reactance that the a-c winding offers to the flow of alternating current. With appropriate external circuits, a saturable reactor can serve as a magnetic amplifier. Also called saturable core reactor, or a transductor.'

"The reason for using such a device," Doc continued, "is that it provides a very sensitive method for detecting small changes in current in a circuit which serve to initiate the corrective action needed in another circuit.

"The flow of current in an a-c coil surrounding an iron core is limited by the 'counter voltage' generated in it by the alternating field that builds up and collapses in the area surrounding the coil. This means that the flow of current in a-c is choked or restrained by reactance in the coil. An iron or steel magnet core has a limited capacity to carry magnetic flux. When fully magnetized so it cannot accommodate more, the core is said to be saturated. In a way, it may be compared to a sponge. When a sponge is full of water, it is saturated and can hold no more water. It is this principle that is at work in the core of the saturable reactor, or, in this case, the transductor. If the iron core is saturated with flux, it has no capacity to carry more flux.

"A transductor is a saturate core reactor which consists of a 'two-window' steel core with an a-c coil on each of the outside cores and a d-c on the middle one. When the a-c coils on the transductor are setting up a flow of flux that is alternating in direction, the rise and fall of this magnetic field, cutting through the a-c coil conductors, generates a counter voltage that opposes the flow of current in those coils. This gives us the opportunity to place a d-c coil (as a control coil) on the middle leg or core of the transductor so it can control the value of current flowing in the a-c coils.

"By applying current through the d-c coil we build up a flow of flux through the outside cores or frame of the reactor. This saturates the two a-c cores with d-c flux, which reduces their capacity to handle a-c flux. With a weakened a-c flux, the counter voltage in the a-c circuit is reduced. As a consequence, the volume of current in the a-c coils rises to a value that permits it to energize the device that it controls. Thus, the passage of direct current in the control coil can amplify the current in the a-c coil. By energizing the d-c coil, more current will flow in the a-c coil.

"With *zero* direct current surrounding the transductor core, the a-c coil winding has maximum reactance and the current flow through it is near zero. If something occurs to energize the d-c control circuit, a wheel slip for instance, the reactance in the a-c coil rises to a value that energizes the wheel slip controls. This makes for a device of high sensitivity and, since it is a static type device, it reduces maintenance requirements. Do you follow me?"

"Yes," replied Sam, "but at the beginning you said I had some experience with transductors under another name. Where was that?"

"You surely remember the saturable core reactors in the control systems of our Alco-GE locomotives."

"Sure," Sam answered; "this fancy new name is what fooled me. As long as we've gone this far, what do these transductors do on the GP20 units?"

"Transductors on the GP20's are used in the wheel-slip control circuits and appear on the wiring diagrams as WST 14 and WST 23. They are static type relays. Current for the relays' a-c coils is received from a connection with the alternator of the main generator. Each transductor consists of two steel cores, each with window areas to accommodate two traction motor cables. These windows are similar to the core openings through which motor cables passed on the older 'through cable' relays. The net flux from the difference in current develops in the magnetic path of the device in the same manner as in the 'through cable' wheel-slip relays.

"While the motors are all in *parallel* connection, transductor WST 14 compares only the currents in Motors 1 and 4, while WST 23 compares currents passing through Motors 2 and 3. When the traction motors are connected in parallel, the action of the transductors is as follows. If exactly the same current is flowing through both motor cables, the impedance of the transductor is so high that very little or no a-c current flows through its relay coils. If d-c flux appears in the magnetic steel loops due to motor slipping, the impedance is lowered and an amount of a-c current proportional to the flux will flow through its coil.

"This a-c signal current appears across a 35-ohm resistor in the transductor rectifier circuit. The signal cur-

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

rent is proportional to the current difference between the two motors which the transductor checks. The a-c voltage is converted to d-c with the rectifier bridge which is part of the wheel-slip control system. The d-c voltage from the rectifier now appears across the coils of the wheel creep (WCR) and wheel-slip (WS) relays. This will pick up the relays when either transductor detects sufficient current difference in the traction motors to signal a wheel slip.

"We must remember that the WST 14 and WST 23 transductors also have duties when the traction motors are connected in series-parallel. We know that WST 14 checks Motors 1 and 4 in parallel and, at the same time, WST 23 checks Motors 2 and 3. These transductors compare current flowing through a pair of motors with that of another pair of motors when they are in series parallel. WST 14, is then comparing the current passing through Motors 1 and 3 with the current passing through Motors 2 and 4. The same thing applies to WST 23. In series-parallel it is comparing the current passing through Motors 1 and 3 with that passing through Motors 2 and 4. This may seem a bit mixed up, but it's true.

"There are other relays in the wheel-slip system that must be considered to get a picture of the entire wheel-slip control. The other relays are designed as WS 13, WS 24, WCR, and WS. These relays work in conjunction with the transductor relays.

"The WS 13 and WS 24 relays are voltage type relays, operated by current flow through the relay coil. The coil of the relay is connected at a point between two motors (the motors being connected in series) and between two fixed resistors to form a bridge circuit. The relay coil is the detector in the bridge that indicates unbalanced voltage conditions. The relay coil will be energized only when an unbalanced condition occurs in the bridge circuit as the result of a slipping motor. These relays detect wheel slipping only when the motors are connected in series parallel. WS 13 compares voltages across Motors 1 and 3, while WS 24 compares voltages of Motors 2 and 4. When these relays are energized, their interlocks operate the wheel-slip light and open the circuit to the shunt field (SF) contactor.

"The wheel-creep relay (WCR) mentioned earlier has a lower pickup value and is thus more sensitive than the WS relay. Its job is to detect a 'wheel creep' before an actual slip occurs. When WCR picks up, it energizes the time-delay-sanding relay (TDS). This then energizes either the forward or reverse sanding valves (FSV or RSV). The WCR is in and responds to the transductor circuit.

"The WS relay, like the WCR, is in the transductor circuits and, like it, will respond either to WST 14 or WST 23. Rectifiers in the transductor circuit permit the relays to respond to the transductor having the highest output. This arrangement requires only one WS relay to serve two transductors. When the WS relay picks up, its interlock drops the battery field contactor (BF) to automatically reduce main generator excitation, momentarily reducing power output. With automatic reduction in power and automatic sanding, the wheel slip can usually be corrected without any action by the enigneman. Then the WS relay drops out, the wheel-slip signal light is shut off, and power returns to normal.

"The wheel-slip relay has two operating coils, known as coils AB and CD. The main coil, AB, is connected to the transductor rectifier and responds to a voltage that is proportional to the difference in motor currents. Coil CD is connected outside the transductor so that the generator (or motor) voltage aids the AB coil to pick up.

"You can see that the wheels on the GP20 unit have little opportunity for slipping. They are under close surveillence at all times.

"Now to recap what we have learned. When traction motors are connected series-parallel, the relays WS 13 and WS 24 are each comparing the *voltage* across each of two motors. At the *same time*, the two transductors have *all* motors under observation. Each transductor is comparing load currents of Motors 1 and 3, with the current passing through Motors 2 and 4. If any motor or motors show an inclination to slip, the WCR and WS relays are alerted and corrective action is taken to stop slipping before it gets started.

"When traction motors are connected in parallel, the transductors are each checking the load currents of two motors. WST 14 is comparing current in Motors 1 and 4, while WST 23 is riding herd on Motors 2 and 3. So I ask, what chance has a slipping motor these days?

"This discussion is getting lengthy," Doc continued, "but I think this outline will introduce you to the names and functions of the principal parts of the GP20 wheel-slip control. Builders are making more use of static-type relays to improve the reliability of locomotive controls. However, maintainers must not become static. We must be up and moving to keep abreast of progress, doing our bit to keep today's diesels on the move."

Testing Aluminum Panels



Aluminum carbody panels, fabricated by Reynolds Aluminum Supply Co., are replacing the standard laminated steel-and-plywood type on Seaboard passenger units. Two units have been equipped for test at Jacksonville, Fla., shop. If the road's expectations for reduced maintenance costs and better appearance are fulfilled, it is planned to equip all 66 of the Seaboard road passenger locomotives. Thirty-six different panel sizes are required for each unit. A bright-finish sheet of 3004 alloy is laminated over a corrugated stiffener of 3105 alloy to form each panel. The New Haven made similar aluminum panel installations on road locomotives a decade ago, and the Burlington has always utilized stainless-steel carbody panels on its road passenger locomotives.



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19 Roll Them Out Like New

Brush Holders and Field Coils

HAVING COMPLETED the reconditioning of the rotating parts of traction motors and generators, now look at the frames and their components. The electrical links between the armature and external circuits are formed by the brush holders. These holders are very important and must operate properly or the machine will be seriously damaged. There are many types of brush holders. If you encounter one that is unfamiliar, study it carefully and read the manufacturer's instructions before you work on it.

First, look at the brush holders on the machine to determine if they should be replaced. Holders that are bent, have badly worn carbonways, or have large chunks melted out of the body should be scrapped. Those to be reused must be cleaned carefully. Damage can result from prolonged exposure of insulators to alkaline cleaning solutions or degreasing solvents. If holders are blast cleaned, be sure not to roughen the carbonways or change their dimensions. A nitric acid dip may give brass body castings a shiny finish, but the risk of damage to other parts is too great to warrant using it.

After cleaning, examine all moving parts. Do the fingers operate smoothly? Does the pad that actually rides on the brush need to be smoothed or replaced? Be very critical of arc burns on springs and highly stressed parts. Judgment backed by experience will tell you the condemning limit for such things. Next, measure the spring tension. If it is not within prescribed limits, adjust it. Some brush holders have a range of adjustment. Be sure that it is possible to get the proper tension within this range.

Check Carbonways

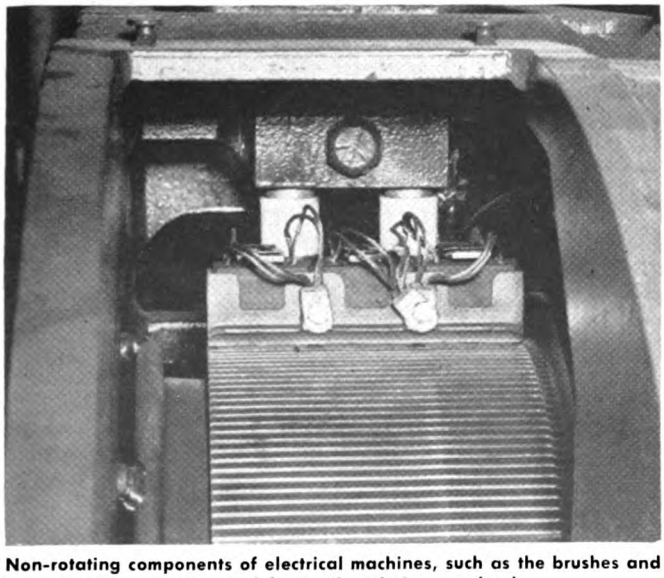
Examine the carbonways. They may be worn too large to hold the brush in correct position. If wear exceeds specified limits, the holder must be replaced. It is possible to make a handy checking tool. Using the end ground to the brush dimension, you can check brush movement in the carbonways and operation of the mechanical parts. If the end ground to maximum permissible size enters, the part must be replaced. Carbonways must be smooth. Remove any metallic beads caused by flashovers, or any grit imbedded in the walls. A small amount of grooving will not hurt if there are no rough edges. Badly grooved parts should be replaced.

The braided copper shunts found on many brush holders are important. If the brush pigtails get loose or are damaged, the shunts carry the current. If there were no shunts, the current would pass through the springs and overheat them. Such overheated springs would soon lose their temper, no longer holding the brushes to the commutator. Severe flashing and ultimate destruction of the commutator would follow. Examine shunts for broken strands, particularly at the ends where they are fastened. If you're not sure a shunt will last until the next overhaul, replace it. Examine all terminal contact points on the brush-holder body. Be sure the surfaces are clean and that threads are in good condition. These connections must be tight and must have low resistance. Care will make assembly easier.

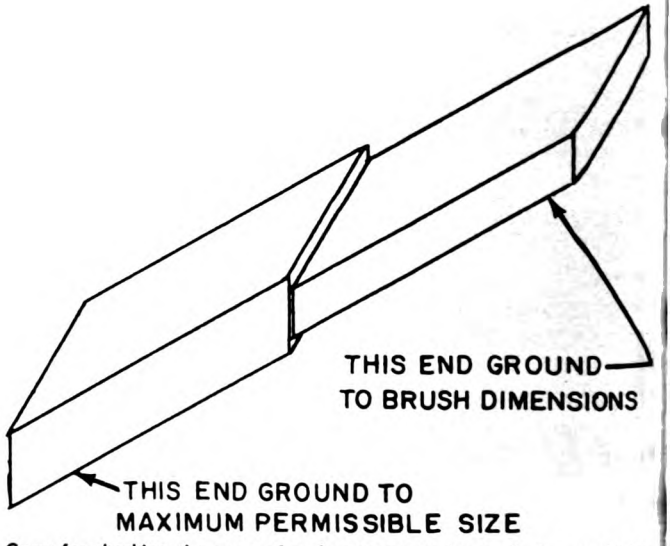
Check the studs that support the brush-holder body. They should be rigid. Types using fiber sleeves can be renewed readily by following manufacturer's instructions. Damaged plastic sleeves can be replaced. Damaged molded plastic or mycalex studs must be replaced. Mycalex studs sometimes show low insulation resistance, espe-

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This is the nineteenth article in the series covering heavy maintenance of locomotive electrical equipment. Part 19 is by J. A. Bates, Locomotive and Car Equipment Department, General Electric Company, Erie, Pa.



Non-rotating components of electrical machines, such as the brushes and brush holders, require careful attention during overhaul.



Gage for checking the wear of carbonways can be made by machining tool stock so that its ends have new brush and condemning sizes.

ially when damp. To correct this, lean the surface thoroughly and bake ntil completely dry. Check insulation esistance to be sure it is practically nfinity. Heat the part to 125-150 eg C and apply a thin coat of insulat-ng varnish, preferably a solventless poxy. Cure with the proper bake ycle for the varnish used.

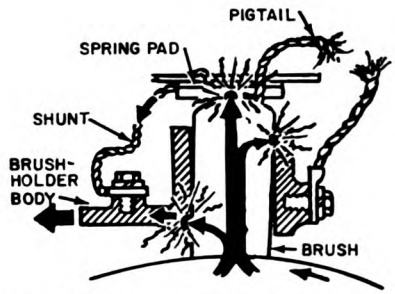
Creepage surfaces on brush-holder tuds require close attention. These urfaces become dirty, are exposed to lashover arcs, and are subject to me-hanical damage during assembly or outine maintenance. Usually the basic nsulation is protected with a more esistant and renewable creepage sur-ace. Porcelain sleeves have long been ised. They have many advantages, but re fragile so that they sometimes rack when hit by severe arcs. Their reat weakness is that they cannot be nade to fit tightly over the insulation, equiring padding or filling. Here care nust be used. If the sleeve is at all oose, remove and refit it. Even if it is tight, check the seals at each end. If there is any shrinkage or cracking, dirt has likely begun to work in, and the sleeve should be removed and reassembled. It does no good to clean and polish the outside of the porcelain if dirt and moisture have formed a creepage path underneath it.

Teflon sleeves are widely used. When properly assembled with a tight shrink fit, there is no chance for a creepage path to form beneath such a sleeve. A mild abrasive household cleaner and acetone work well for cleaning dirt from the slightly rough surface. This operation improves the surface appearance, but is not a necessity. Dirt in the minute, isolated pockets does not affect performance. The molded plastic stud, when new, has a smooth surface which sheds dirt readily. If harsh abrasives or strong solvents are used for cleaning, the surface will be roughened. It then collects dirt faster and becomes progressively harder to clean.

After assembly, the brush holder should be given a high-potential test. In the absence of specific instructions, a safe value is 1,000 volts higher than the final hi-pot value for the completed machine.

Field Coils

The first step in reconditioning field coils is to learn as much as possible about the history of each one—



Pigtail fraying forces current to go through carbonway, spring tip, and the spring shunt.



If shunt loosens after pigtail fails to carry current, spring itself becomes current path. Heating causes it to lose its temper.

whether it is in for routine mileage overhaul, or has given trouble. Often damage is obvious. It would be good to consult the machine record and, perhaps, talk with the man who removed it from the machine.

Coils should be carefully inspected, paying particular attention to any signs of chafing. If the coil needs only to be cleaned and revarnished, it can probably be done in an ordinary electrical shop. If it requires rebuilding, most railroads rely on specialized repair organizations. Be sure such a supplier can do a complete job and that he will return coils that will perform as well or better than they did originally.

The long accepted method for insulating the field coil is to fill the inside with asphalt or other impregnant and cover the outside with ground insulation. This "mummified" construction can give excellent service. It offers good protection against moisture and dirt.

Reconditioning a mummified coil is simple if the coil is not grounded or otherwise damaged. First, it should be thoroughly cleaned and baked. While still hot, dip the coil in a good insulating varnish and let it soak for a few minutes. Drain and bake, repeating this procedure two more times. The coil should then be ready for many more miles of service. If the outer tape is damaged, it must be removed. Be careful not to harm the underlying mica tape which provides the basic insulation. Heating to about 100 deg C will soften the varnish, making tape removal easier. Use the correct thickness when retaping so the finished coil will be the proper size. A grounded coil must be completely reconditioned. This takes much skill and experience. It's probably best to send such coils to specialists in this work.

The main objection to mummified coils is that the thick insulation which keeps dirt out also tends to keep heat in. Considerable heat leaves a typical main field coil through the frame. Because air is a very poor conductor of heat, it is important to have a solid insulation path from the bottom edge of the copper to the frame. The coil is never perfectly flat, making it necessary to fill the spaces between the copper and the frame with some material. One method is application of enough compressible insulation to adjust for the uneven coil surface, allowing the coil to fit tight enough to get the required compression.

Commutating Coils

In contrast with the exciting coil, most heat generated in a typical commutating field coil leaves through the edges of the copper, either to the pole piece or to the ventilating air. If mummified insulation is used on such a coil, air pockets may form on the sides, interfering with heat flow. Much effort has been put into improving heat transfer through the insulation on the sides of such coils. This is done either by filling the coil with a thin resin to eliminate air gaps, or by molding insulation solidly around the copper. Remember one thing: if you replace a bare-center-turn coil with an insulated one, you will probably lose some rating. This may be insignificant. Because it can be serious, check its effect on the machine involved.

Two classes of insulating varnishes are widely used—phenolics and alkyds. Both are good. Phenolics are harder and bond better. Alkyds are softer, withstand heat better, and crack less. Both resist cleaning solvents, are easy to use, and inexpensive. While these are the principal dipping varnishes, silicones and polyesters are used for certain specialized applications. Epoxies are now available in an amazing variety and offer some advantages. If it is decided to utilize them, work with reputable varnish

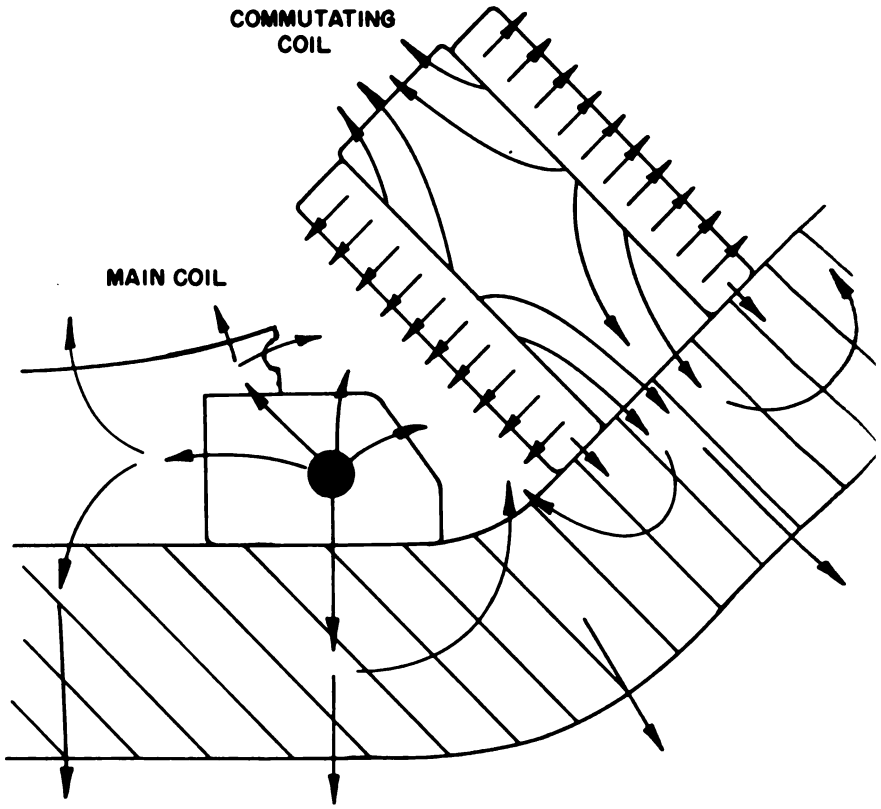
makers who understand railroad requirements. Do not look only at the properties of individual epoxy-insulated coils. Remember that your concern is a complete machine which will give many thousands of miles of satisfactory service.

Many coils still in service have paper-backed mica tape. When rebuilding, consider using glass-backed, silicone-bonded mica tape. Its advantages more than justify its higher cost. It is strong and easily pulled tight, does not have to be kept in air-tight containers, and will increase the temperature rating of the insulation. In place of flake mica, integrated mica or mica paper is now being used with various backing materials to make tapes. It is easy to apply and has the advantage of uniform thickness. Its compressive strength is not high, so it should not be used at points of extreme pressure concentration.

Glass Tapes

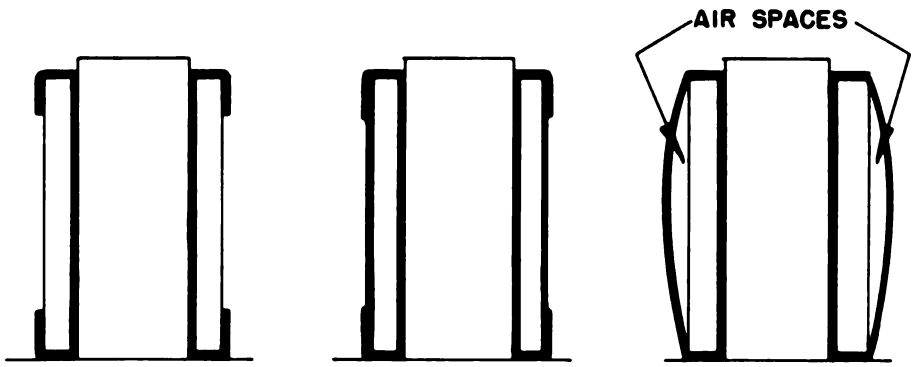
Glass tapes have replaced those of cotton and asbestos. Glass tapes are easier to handle and cause less skin irritation if they are soaked for about an hour in clear dipping varnish diluted with an equal amount of thinner. They should then be dried for two hours prior to use. Don't treat too much tape at once, because in about a week it becomes too stiff to use.

Coating coil terminals with a stripping compound before varnishing will save a lot of time. Even then, terminals must be carefully cleaned before the coil is ready for use. Ream out drilled holes and retap tapped holes. If coils are compounded in the pole pieces, be sure to clean the taped pole piece holes. Covering these with pressure sensitive tape will make the job easier. All varnish should also be cleaned from the pole-piece ends that fit against the frame. A clean metal-to-metal fit here is a critical factor in determining the magnetic properties of the machine.



Heat paths vary for different types of field coils. While commutating coils lose the heat generc in them either to the pole piece or ventilating air, the exciting coils usually are cooled prima by their contact with the frame of the machine.

Proper coil identification is very important. Some coils have terminal connections crossed internally. This gives rise to "open" and "closed" coils. Sometimes they look alike, but interchanging them in assembly will give the wrong polarity. Mark all coils plainly, either with embossed metal tags or by painting.



Coil insulation can be major factor in temperatures developed. In test, equivalent coils showed 90-deg C temperature rise with bare center turns and 240-deg C rise when ineffective bonding produced air space between copper and insulation.

Coils should be tested as complet as possible before assembly. Res ance can be measured, recorded a compared with correct values to sure there are no open circuits. F sistance measurements do not alw show up short circuits between tu on heavy coils. It is much better measure impedance with a-c, comp ing the result with the correct val Probably the most sensitive test is connect the coil as the secondary o transformer whose primariy is exci with a frequency of 60 cycles, higher. Even coils that pass these te may be found to be shorted followi assembly, because clamping pressu can cause shorts that did not exist b fore. Coils assembled on pole pie can be given a sort of hi-pot test grounds. However, there is genera one face that is not tested. Compou wound coils should be hi-potted tween windings. Be sure to use proper voltage or you may cause necessary failures.

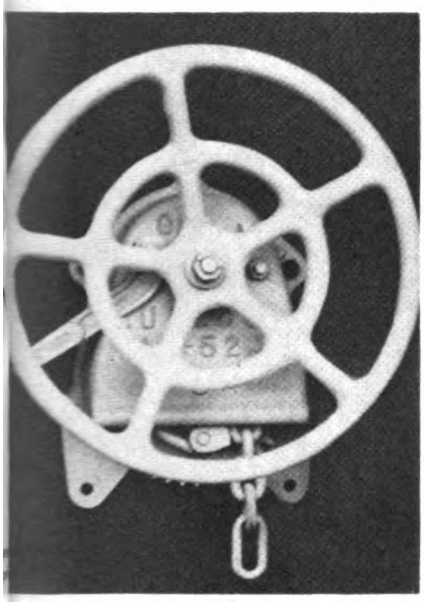
As a final precaution, take care prevent damage to the finished c during shipment and storage. F member, it takes just as much time a money to repair a coil that falls o hand truck, or is placed on a sh chip, as one that fails after a mill or more miles of hard work.

What's New

(Continued from page 15)

rrent is also available. Minneapolis-oneywell Regulator Co.

For more information, circle 6-13 on coun on page 65.



ower Hand Brake

he mechanism of the Type V-52 Ureco, gh-power, vertical-wheel hand brake dif-rs from other types on non-spin design. It said to feature quick take-up and release id ease of operation, and is applicable to ost types of freight cars. AAR Certificate Approval has been issued. Union Rail-ay Equipment Co.

For more information, circle 6-14 on coun on page 65.



otary Cleaning Tool

leaning rates of 45 to 65 sq ft per hr are id to have been obtained with the Von rx miller, a rotary cleaning tool for re-oval of rust, scaling, and cleaning of large reas. The tool, a product of P. Von Arx Co. of Switzerland, can be fitted either ith hardened steel cutting blades, or wire rushes. Easily adjusted guide plates con-ol depth of cut and degree of smoothness n the finished surface. While the standard odel is pneumatically driven, electric rives are also available. The tool weighs 5 lb. C. J. Breitenstein Co.

For more information, circle 6-15 on coupon on page 65.



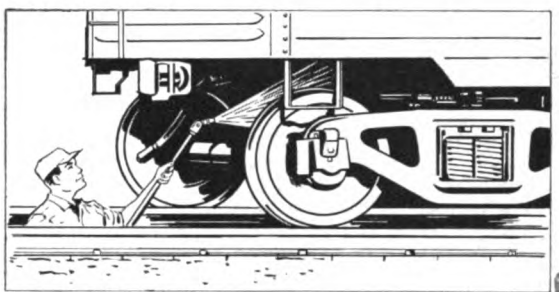
Side-Frame Wear Plate

Carbon-steel is used in side-frame wear plate WP-10 designed for use with the unit type brake beam. Plate fits into any unit guide pocket except that for the No. 36 beam. By eliminating flanges, the surface of the wear-plate sides extends beyond the side-frame guide pocket castings enough to protect the castings, at the same time providing an extra shelf for the brake beam to ride on. Nothing in the plate restricts the movement of the brake beam. Stanford C. Nelson Co.

For more information, circle 6-16 on coupon on page 65.

Epoxy Potting Compound

Conap 1610, a flexible epoxy potting and encapsulation compound for large and small transformers, coils and other electri-

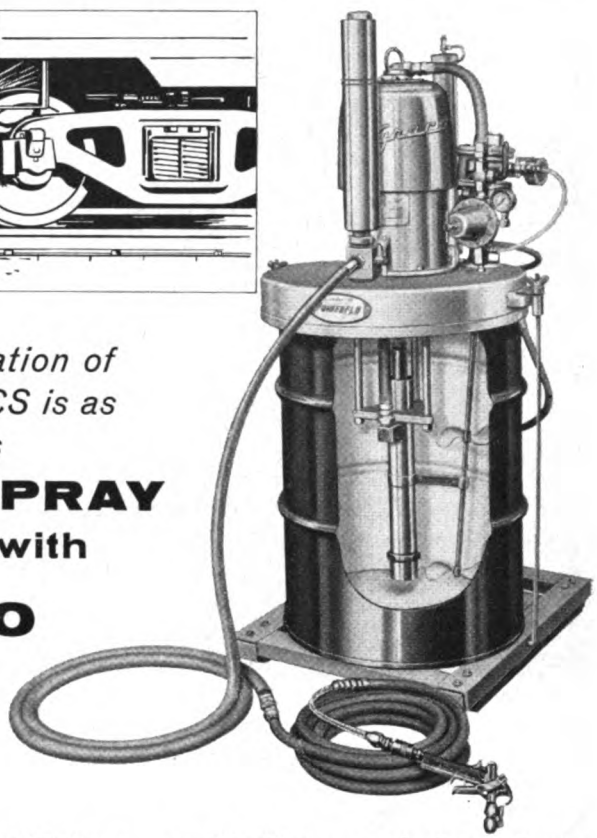


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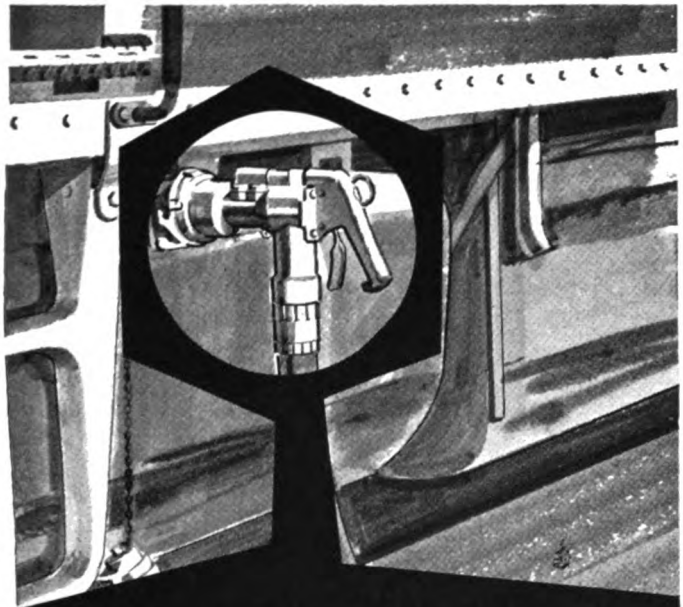
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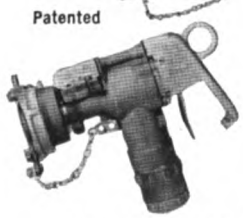
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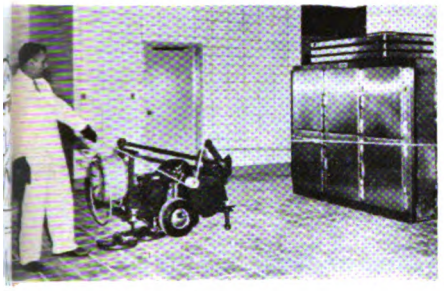
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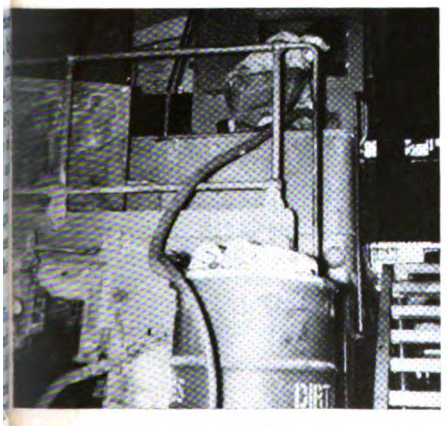
For more information, circle 6-17 on coupon on page 65.



Power Winch

Two suction cups, under vacuum pump pressure, anchor the Ensely power winch to floor, wall, sidewalk, or pavement. Where a smooth gripping surface is unavailable, anchor chains are used. The unit, which is mounted on three wheels with balloon tires, can be wheeled up stairs, through doorways, and around corners, and can be placed in the bed of a pickup for hoisting jobs. It weighs 340 lb but handles loads up to 4,000 lb. Ideas, Inc.

For more information, circle 6-18 on coupon on page 65.



Waste-Removal Equipment

Grease, oil, and other wet or dry materials can be removed from floors, pits, and similar areas; sand removed from locomotive sand boxes during heavy repairs or high-voltage boxes cleaned with the portable Vac-U-Max vacuum designed for railroad use. The machine has no electric motor or connections; it is connected to the existing compressed air line. Air passes through a



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For more information, circle 6-19 on coupon on page 65.



Temperature Control

The Reef-Air compact, transistorized temperature control is said to electrically maintain refrigerator car temperatures from minus 10 to 70 deg F within 1.5 deg of the temperature selected. The unit consists of a temperature selector, control panel and sensor. Signals from the thermistor sensing element are amplified and actuate heating or cooling relays through transistorized switches. The magnetic amplifier requires no vacuum tubes and is unaffected by ambient temperatures. Vapor Corp.

For more information, circle 6-20 on coupon on page 65.

Report

(Continued from page 8)

25 electric, and 7 gas turbine-electric—according to the AAR. In 1960 they installed 366 new units—353 diesel-electric, 1 electric, and 12 gas turbine-electric units. Locomotive units on order January 1, 1962, totaled 263, of which 222 were diesel-electric, 40 electric, and 1 gas turbine-electric. On January 1, 1961, Class I railroads had 122 locomotive units on order, of which 49 were diesel-electric, 65 electric, and 8 gas turbine-electric.

Court Action Ends On Running Boards

Union Tank Car Co. has announced that it has won a 4½-yr legal battle to eliminate running boards from its patented HD ("Hot Dog") tank car. The company said the dispute ended when the Railway Labor Executives' Association abandoned a complaint in the federal court for the District of Columbia attacking an Interstate Commerce

nmission ruling of August 1961 (RL&C, t. 1961, p 5).

he ICC decision had upheld Union k Car's contention that running boards HD cars are not necessary and, under ain conditions, are actually unsafe, the ıpany said. "The elimination of running rds from tank cars represents another ificant advance in tank-car design," said vin A. Locke, Jr., Union Tank Car presi- t.

The resulting simplicity of design will :e the new cars easier and safer to load unload, repair, and inspect," Mr. Locke . "Larger payloads are possible since :an increase the diameter of the tank by nuch as 15 in. when running boards do have to be considered in calculations for clearance."

he legal proceedings date back to Au- 19, 1957, when the company filed its inal petition with the ICC following the oduction of its HD car. The HD car zes the tank shell as a structural mem- eliminating any need for a center sill.

he company said that the ICC ruling k official notice of the fact that under ent-day railroad operating conditions e is no need for trainmen to traverse the of cars in road service and also of the that nearly half of all types of freight in the U.S. are not equipped with run- boards and are not required to be so pped.

tches and Louvers ıght for Coil Cars

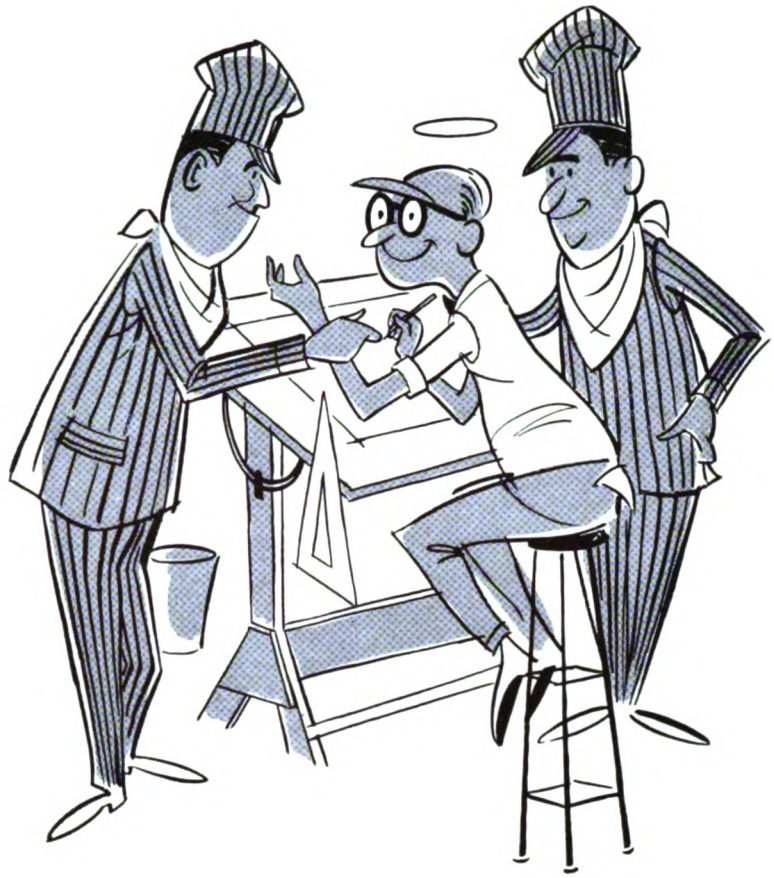
simplify inspection of lading and secure- its while cars are en route, the AAR :hanical Division has recommended that dola cars having removable covers be ipped with inspection hatches by the owners. Shipments of coiled and sheet can then be examined without shop- the cars for removal of covers, if it is ected some unusual condition has de- ped.

he Mechanical Division also suggests car builders and carriers consider in- ation of a special design of louver or ilator on each side of all present and re cars of this type to allow air circula- while excluding rain and snow. Dur- the past winter, condensation in the cars ed some rusting of products during ment.

reased Load Limits ɔmitted to Ballot

isions of Interchange Rules and the R Manual, including appropriate con- , to implement the authorized increase ad limits for freight cars have been sub- ed to AAR member roads in a special :hanical Division letter ballot. Also in- ed in the ballot, scheduled to close on 14, are revisions of the specifications car journal lubricating devices and for :e-cylinder release valves.

he Division points out that this is not ther vote on the previously approved ɔosition to increase freight-car load ts by 5%. The new proposition, to be- e effective August 1, 1962, if approved, ld involve changes supplementing the



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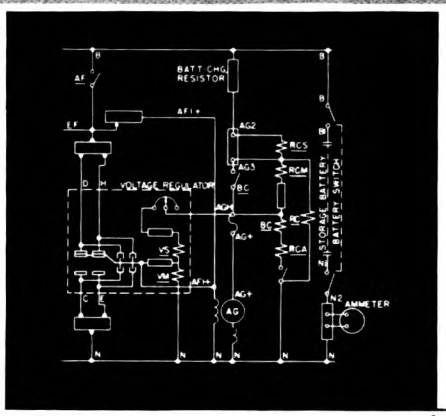
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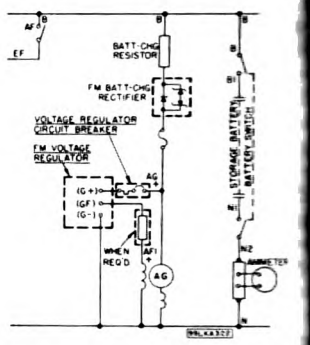
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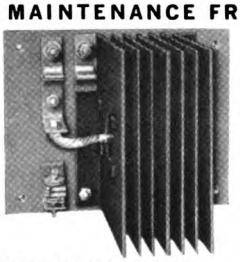
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ıendments and revisions involved in ıg the 5% increase effective include:
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A Manual page showing a new design 6 inner coil required to obtain higher ities in the 50-ton spring group;
A change prohibiting indiscriminate ıg of cars beyond their proposed new limits and special provisions for flat ıandling extraordinary loads weighing :ess of stenciled load limits;
Requirements that a handling line a defect card when a foreign and te-line car car has been known to be oaded;
A requirement that prior to delivery ıaded or empty cars in interchange, :rs remove axles for inspection and ıping, if necessary, when they are ⁄n to have been repeatedly overloaded ıeir own lines;
Provisions for removal of axles for :ction and renewal, if necessary, on ority of defect card issued for "axles ed beyond limit;"
Authorization of 5% in total weight ail for four-axle freight cars, including ange in Standard Axle table in Rule 86 :ad:

Axle letter and journal size	Total weight on rail, lb
B – 4¼ x 8	103,000
C – 5 x 9	142,000
D – 5½ x 10	177,000
E – 6 x 11	220,000
F – 6½ x 12	263,000

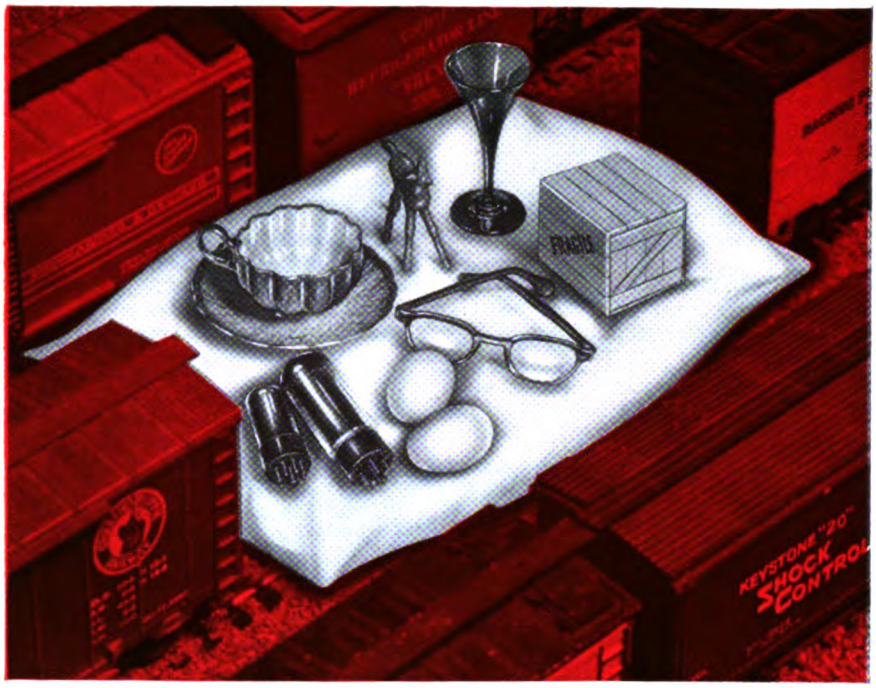
new section proposed for addition to :ification M-918, Car Journal Lubricat- Devices, requires checks of lubricators the AAR or purchasers to insure that lity is maintained; the use of more ngent tests for core materials, and the tening of "Conditional Approval" re- ements by reducing the number of per- sible hot-box set-outs from 105 to 80 4,000 car-months.
Brake-cylinder release valves and brack- furnished by manufacturers at the pres- time cannot be interchanged on freight s because of functional and dimensional erences. The proposed revision in the :ifications will provide a standard that ld insure complete interchangeability of type:.

ersonal Mention

esapeake & Ohio. — *Huntington, W.Va.:* W. WALKER appointed general foreman, :ceeding D. S. JOHNSTON, retired. *Wal- dge, Ohio.:* H. R. BAYS appointed general foreman. *Clifton Forge, Va.:* JAMES N. IDERSON, car inspector, appointed car rication inspector.

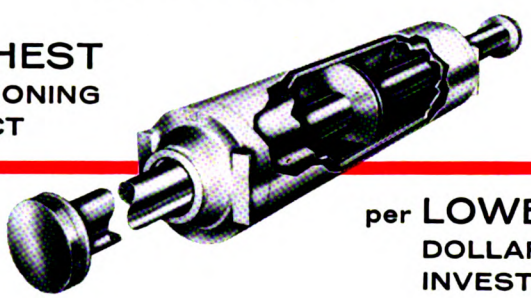
nver & Rio Grande.—*Denver, Colo.:* PAUL STARR, master mechanic, transferred m Salt Lake City. *Salt Lake City, Utah:* HN P. SPIESS, shop engineer, mechanical partment, appointed master mechanic, :ceeding Mr. Starr.

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Frisco.—*Tulsa, Okla.:* HERBERT F. RICHARDSON appointed master mechanic, succeeding GEORGE M. JESSEE, retired. *Sherman, Tex.:* JAMES H. HALL, JR., appointed master mechanic, succeeding Mr. Richardson. Mr. Hall formerly assistant master mechanic, Tulsa.

Interstate Commerce Commission.—*Felix Polanowski* and *Horace J. Haskell,* inspectors of locomotives at Buffalo, N.Y., and Philadelphia, Pa., respectfully, retired.

Milwaukee: *Milwaukee, Wis.:* F. A. UPTON appointed chief mechanical officer. Sketch and photo of Mr. Upton upon his appointment as assistant chief mechanical officer appears on page 42 of the April issue.

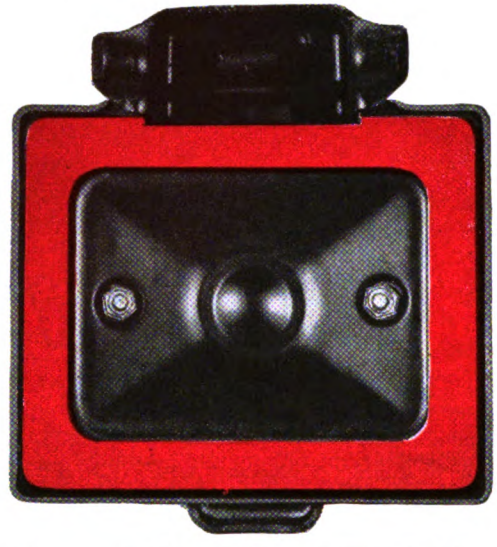
Pennsylvania.—*Harrisburg, Pa.:* R. M. BAILEY appointed assistant master mechanic.

Southern.—*Knoxville, Tenn.:* JACK F. GREEN appointed road foreman of engines.

OBITUARY

F. H. Hardin, 75, formerly assistant to president-mechanical, New York Central, and president, Railway Wheel Association, died March 21 at his home in Sea Island, Ga.

Joseph W. Tragnitz, 62, general master mechanic in charge of motive power, Illinois Central, Chicago, died March 29.



Now Available

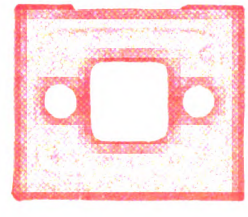
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- **Completely Seal Journal Box Face.**
- **Easily Installed and Easily Serviced.**

Exhaustively tested for two years, Motor Wheel Pressed Steel journal box lids with Neoprene seals still provide a complete seal at the end of the tests! One major road now has 1,500 hopper cars equipped with these lids and seals.

Motor Wheel Oil Seals are Neoprene closed cell rubber skin both sides. They are held tightly against the lid by a solid stamped retainer plate, fastened by two standard bolts, nuts and lock washers. Combined with Motor Wheel's exclusive "Constant Pressure" compression spring, 40 to 65 lbs.-per-sq. inch lid pressure makes a complete seal at the face of the journal box.

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11

National Sales Representative
T-Z RAILWAY EQUIPMENT CO.
8 S. Michigan, Chicago 3, Illinois

Supply Trade

SIMMONS-BOARDMAN PUBLISHI CORP.—Chicago office of Simmons-Boa man, publisher of Railway Locomot and Cars, moved from 79 West Monroe to 22 West Madison st., Chicago 2.

■

AMERICAN AIR FILTER CO. — *Barnstable* appointed sales mana AMER-glas products.

■

BRODERICK & BASCOM ROPE CO *J. J. Sieber,* vice president-sales, elected ecutive vice-president.

■

ALAN-WOOD STEEL CO.—*William Field* appointed Empire State district s manager, succeeding *Richard G. Flem* deceased. *William C. Decker, Jr.,* appoin sales representative, New York district.

■

A. M. BYERS CO.—*John C. Madden,* pointed general manager of sales.

■

AMERICAN STEEL FOUNDRIES CORPORATED. — *Robert G. Bross* named New York railway sales represen tive, Hammond division, with responsibi for sales of railroad products in New E land area.

■

JOURNAL BOX SERVICING CORP. *Tom Collins* appointed vice-president, sa

■

SPRING PACKING CORP.—*R. W. M Donnell* named vice president and direc of research and development. *C. J. Kr* and *H. Lock* appointed vice-presidents charge of sales, eastern and western are respectively.

■

PYLE-NATIONAL CO.—*Charles P. C rie* elected vice president-sales.

■

OUTBOARD MARINE CORP. — *Rob E. Spear* appointed resident sales engine Western region, OMC Engines and Equ ment Division. Mr. Spear will be respon ble for sales of Midland railroad accesso in eleven western states.

■

GENERAL STEEL INDUSTRIES, INC. Chicago office closed.

■

TRANSPORT LEASING CO.—*A. M. M ers* appointed chief mechanical officer Hammond, Ind.

■

ARMSTRONG CORK CO.—*A. J. Slosse* manager of industrial railroad adhesi sales, appointed manager of urethane an fluoro-carbon sales, Industrial Division, su ceeding *Ralph M. Hill,* retired.

■

ELECTRO-MOTIVE DIV., GENERAL MO TORS.—*G. M. LaRiviere* appointed assistan general sales manager, in charge of sta services, at LaGrange, Ill. *B. K. Wingerte* Eastern region, succeeds Mr. LaRiviere a regional manager, Eastern Region, Ne York.



28,300-gal tank car, designed to transport liquid hydrogen from government production ...s on the East Coast to rocket development test sites on the West Coast, has received an ... of Merit from *Materials in Design Engineering* in 1962 competition for the best use of ...ls in product design. The cars, built by Union Tank Car, are insulated with Super Insula... glass fiber and aluminum foil in a vacuum, which has made possible shipment of cryogenic ...t minus 423 deg F with evaporation losses of less than 0.3% of car capacity per day.

...N-STEEL CORP., A DIVISION OF NA... STEEL CORP. — *F. G. Baroni* ap... manager, Transportation Product ... with headquarters in Chicago.

■

...NG SPRING & WIRE CORP.—*Jo... H. Barnett* appointed vice-president, ...ment Division, with responsibility for ...manufacturing, engineering, and pur... g.

■

...INGHOUSE AIR BRAKE CO. — *Morris* appointed product manager, Transit Sales, Air Brake Division. *Mr. Morris,* formerly district engineer at New York, will concentrate his activities on the braking requirements for the many transit systems under survey and development in the United States.

■

DEARBORN CHEMICAL CO. — *Donald B. Bishop* appointed vice-president—transportation sales, Mr. Bishop formerly assistant vice-president and manager, Pittsburgh district.

■

NATIONAL CASTINGS CO. — *Wilson H. Moriarty,* first vice-president, retired.

Products Reference No. 63A

EAGLE ...VENTIVE SAFETY

EAGLE Oily Waste Cans
For safe disposal of oily waste and rags. Vital to every plant to reduce fire hazards. Come with or without foot lever. Listed and labeled by U/L and F.M. 6, 10, 14, 21 gal.



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FOR GENERAL SHOP USE AND REPAIR FACILITIES



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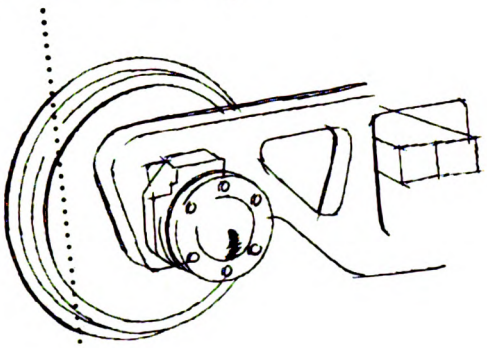
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Ratchet Handle Hoists...a versatile tool to lift, pull, drag and stretch in car repair and shop maintenance. 3/4 to 6 tons. 3/4 ton weighs only 14 lbs.

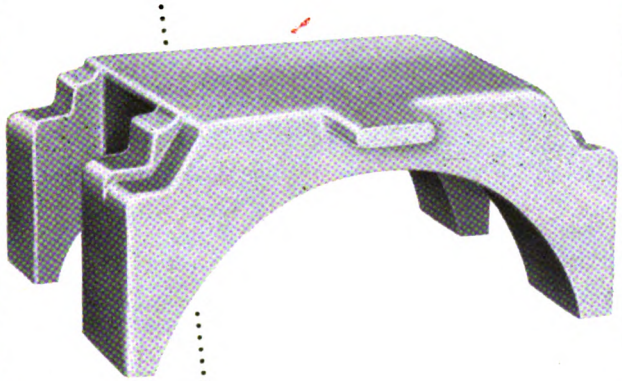
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Warehouses in Principal Cities

A COMPLETE FAMILY OF FINE MAINTENANCE PRODUCTS

ICAN HOIST & DERRICK CO.—*A. Anderson* appointed service er.

■

NDUSTRIES, INC. — *Thomas W. on,* director, engineering and re- elected vice-president of engineer- d research, Philadelphia.

■

O CORP. — *William F. Moore* ap- d manager of railway sales, Rubber cts Division. Mr. Moore formerly ngineer, industrial sales department division.

AMERICAN PULLEY CO.—*Jerry Ludwig* appointed manager of railroad sales, with headquarters in Chicago.

■

SPARTON CORP.—*A. H. Adkins,* 1507 M st., N.W., Washington 5, D.C., appointed manufacturers representative, covering southeastern portion of the United States.

OBITUARY

JAMES G. MOWRY, 80, former railroad sales representative for Pittsburgh Plate Glass Co., died in Sandusky, Ohio, on April 12.

ıde Publications

TEELS. Engineering and design book- 55 describes new Bethlehem V steels h-strength as-rolled steel shapes and —for construction and general pur- applications. Steels provide minimum points from 45,000 to 65,000 psi. ehem Steel Co.

RANES. 4-page bulletin gives techni- ata on five models of self-propelled n-Western hydraulic cranes, truck or nary mounting. Capacities to 11 tons. vin-Lima-Hamilton.

EMPERATURE CONTROL FOR EL LOCOMOTIVES. Bulletin 4050 detailed description of Vapor diesel ıe temperature control. Vapor Corp.

SANDBLASTING SET. Leaflet (Form SS2625M) describes Handi-Blast in- ial sandblasting set. Hamill Manu- ıirng Co.

PAINTS. Brochure V-89 contains tech- data on formulations and performance eat resisting paints, also temperature e reference chart. Joseph Dixon Cruci- Co.

FLANGE CUTTER. Folder describes improved FCC flange cutter with float- utters and floating abrasive pad. Wheel ing Brake Shoe Co.

31. ADHESIVES. Chart in Bulletin BA 10 identifies specific applications for which Bostik pressure-sensitive adhesives are particularly suited. United Shoe Machinery Corp.

32. INSULATION TEST INSTRUMENTS. Bulletin 4-10.28 describes new line of insulating materials testing instruments and test fixtures designed to ASTM requirements. Associated Research, Inc.

33. TESTING MACHINES. Bulletin 135 illustrates types of lubricant, friction, and wear testing machines most commonly used, also machines developed by company's Research Department. Tests conducted on five lubricants on two different types of machines also compared. Alpha-Molykote Corp.

34. LEASING SERVICE. "A Profitable Approach To Piggybacking" discusses advantages to railroads of leasing, rather than buying, truck and trailer fleets, and such equpiment as diesel refueling and general repair trucks. Berman Loading Co.

35. AIR TOOLS. 26-page catalog describes complete line of Remington air tools, including die grinders, drills, impact wrenches, etc.; standard equipment furnished; specifications, and accessories. Remington Arms Co.

eader Service

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Railway Locomotives and Cars
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June, 1962

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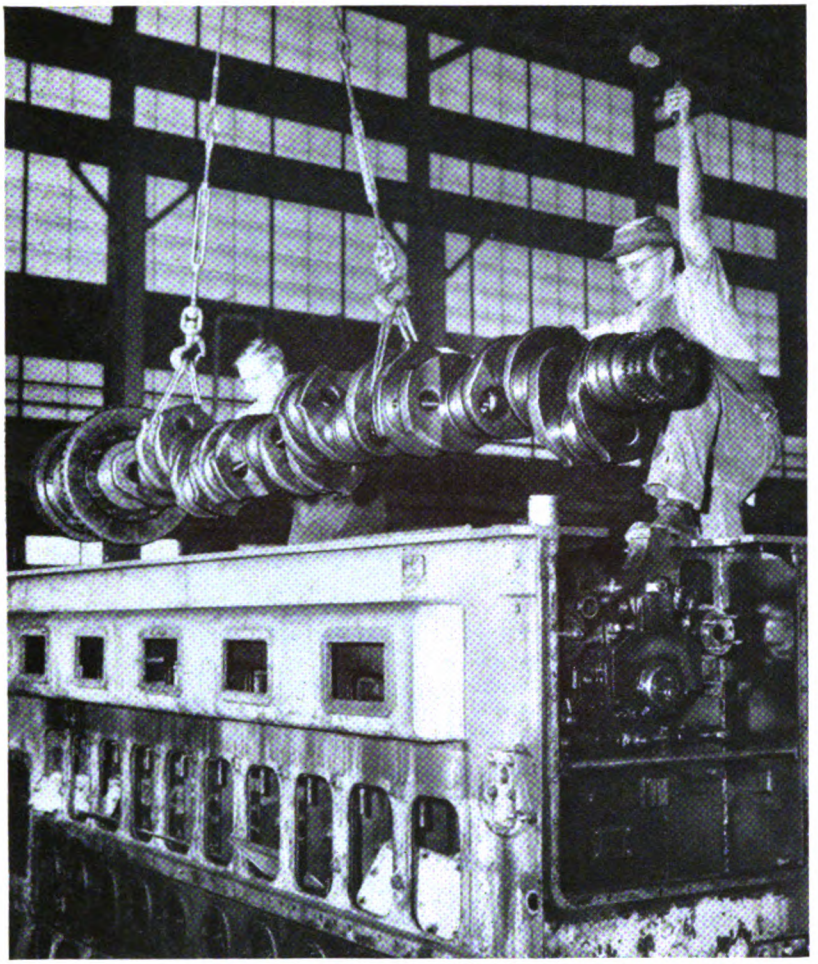


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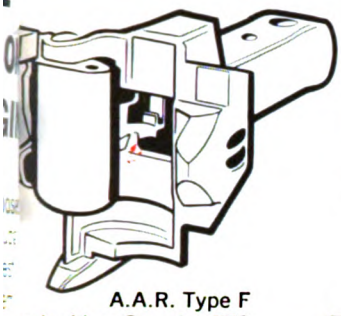
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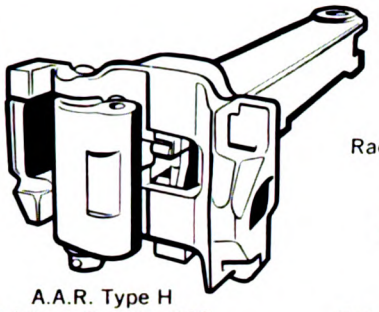
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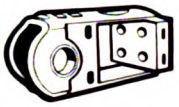
A.A.R. Type F
erlocking Coupler F70



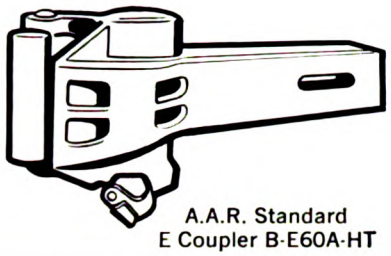
A.A.R. Type H
Tightlock Coupler H80



Radial Connection Y25A

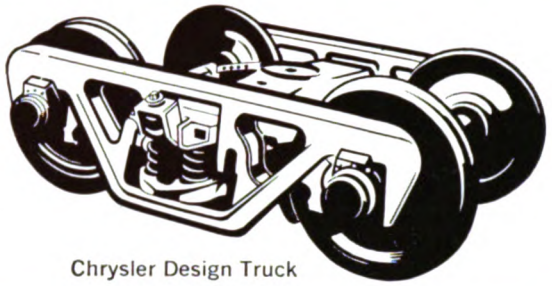


Yoke Y65 for
Twin Cushion Draft Gear

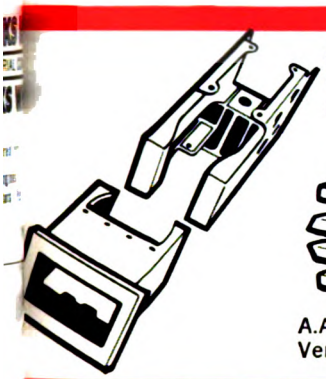


A.A.R. Standard
E Coupler B-E60A-HT

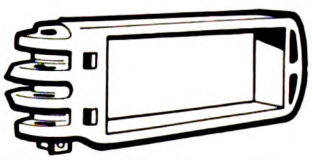
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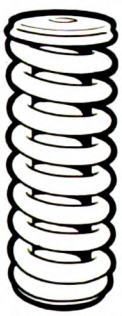


A.A.R. Alternate Standard
Vertical Plane Swivel Yoke Y30

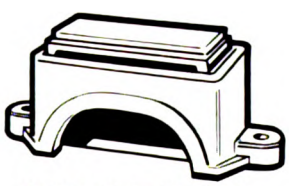
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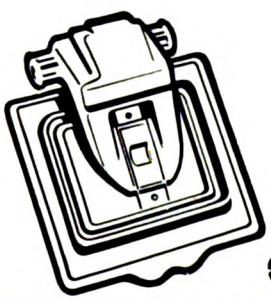
Freight Car Truck
ring Snubber Group



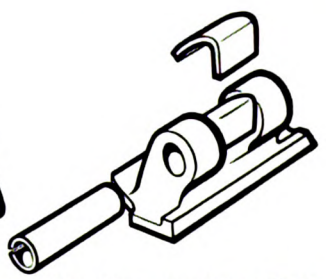
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Montreal, Quebec

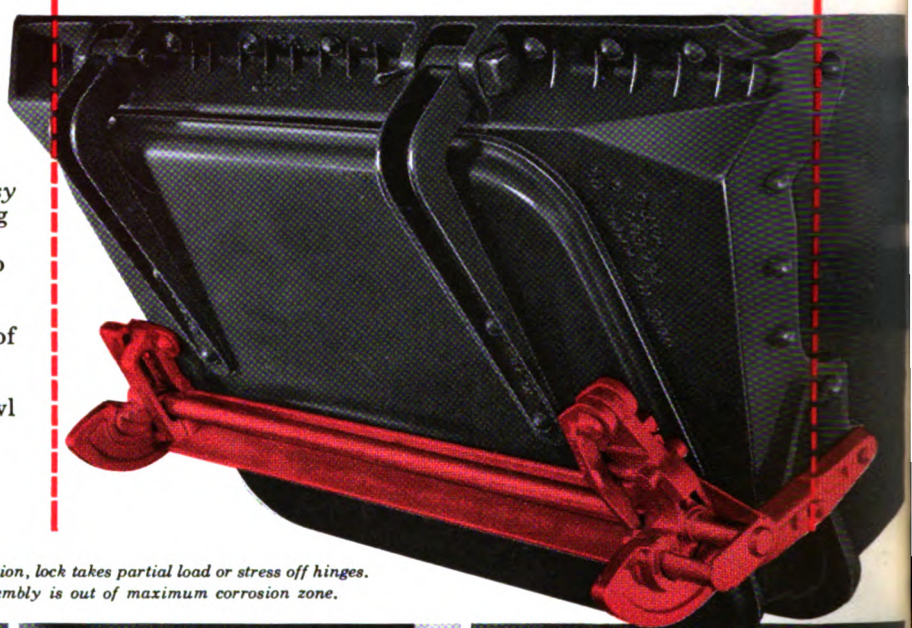
NEW

EXCLUSIVE
CAM ACTION LOCK *

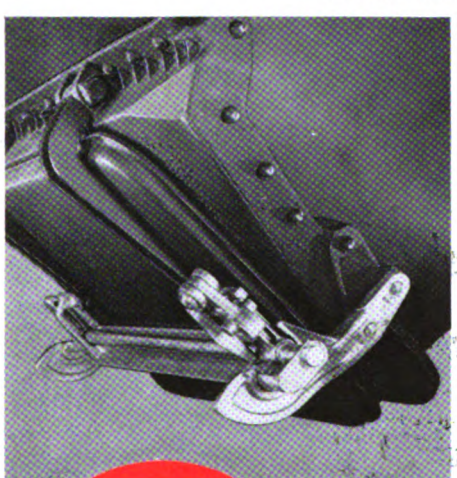


FULL WIDTH
SINGLE HOPPER DOOR LOCK

For the car builder, this new lock means *lower* installation costs. For the operator it means *safe, sure* and *fast* operation. The exclusive cam action makes operation *extra easy* and provides *reserve* power for pulling the door up tight. Comes ready to install—only nine rivets required. No extra materials. No extra expenses. Each part is built to a fixture to assure an accurate fit. Unit consists of inside and outside hooks plus door member assembly: shaft, reinforcing angle, cams, bearings, pawls and pawl brackets. We'd be pleased to demonstrate *all* the advantages of this new lock. See your Wine representative or write us for more information.



In closed position, lock takes partial load or stress off hinges. Door lock assembly is out of maximum corrosion zone.









Door in final locking stage. Cam on each side goes to dead center for positive locking action. Operating head near outside of car. *Inset:* Locking pawl serves as safeguard . . . door *stays* locked.

Initial opening is safety step requiring approximate 90° turn. Door opens *part* way. This step suitable for discharging fine materials or where conveyor system is inadequate for full discharge.

Further rotation of bar disengages hooks so door swings freely on hinges. Swinging door after car is empty returns it to safety position and use of bar through cam brings door to final locked location.

* PATENT PENDING

WINE RAILWAY APPLIANCES

THE WINE RAILWAY APPLIANCE CO.
DIVISION OF UNITCAST CORPORATION • TOLEDO 9, OHIO

PFE Opens Reefer Repair Shop

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How the Hydraulics Are Doing

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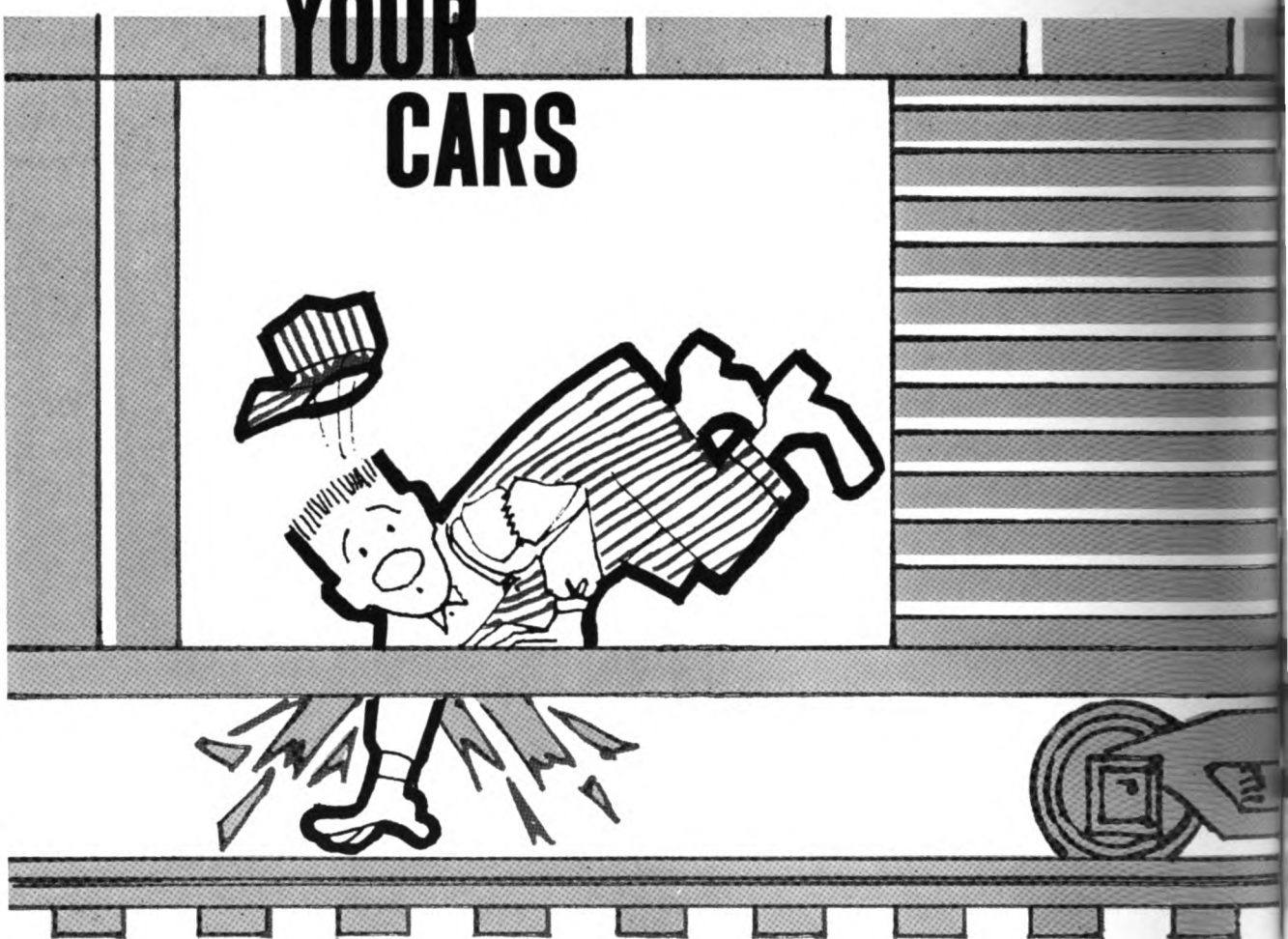
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A. Welsch—AAR Mechanical Division Chairman page 23

LOOK IN YOUR CARS



For car floors that *stay* in good shape, Armco Freight Car Flooring is a low-cost solution.

Armco Floors are wood *and* steel. Stout wood planks are ***nailable.*** Top beam strength and solid floor surface are provided by alternating steel hat sections. Planks and steel beams both reinforce car underframes —resist damage to floors while they protect lading.

Get complete information about these durable floors that come tailored to your cars. Call your nearest Armco Sales Office or write Armco Division, **Armco Steel Corporation, 2802 Curtis Street, Middletown, Ohio.**

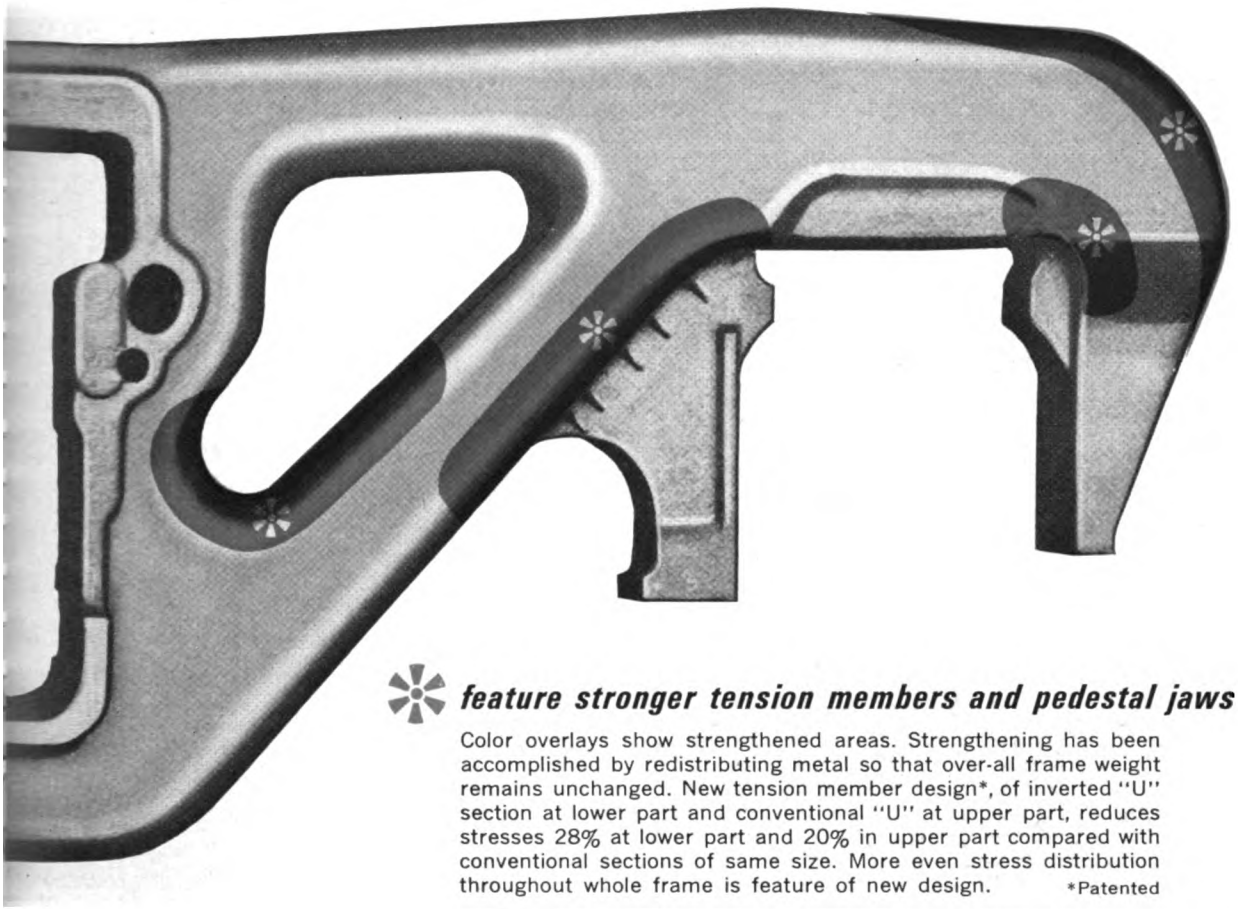
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For Strength, Durability, Economy

ARMCO

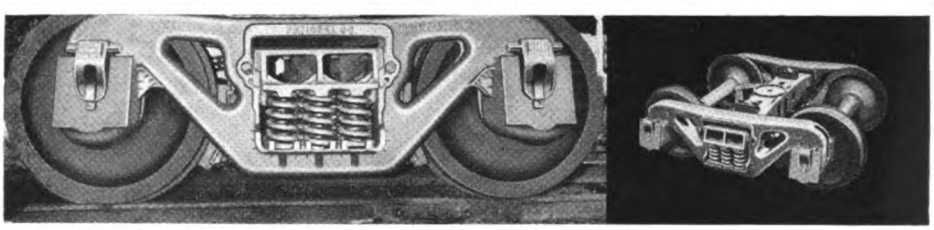
Armco Division

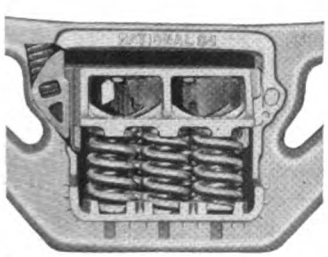
NEW 6½ X 12 HEAVY DUTY
NATIONAL C-1 TRUCKS



feature stronger tension members and pedestal jaws

Color overlays show strengthened areas. Strengthening has been accomplished by redistributing metal so that over-all frame weight remains unchanged. New tension member design*, of inverted "U" section at lower part and conventional "U" at upper part, reduces stresses 28% at lower part and 20% in upper part compared with conventional sections of same size. More even stress distribution throughout whole frame is feature of new design. *Patented





Service-Proven C-1 Snubbing Mechanism Gives Smoothest Ride at Lowest Maintenance

The new 6½ x 12 truck is the top of the C-1 Truck line — the most desirable heavy-duty freight truck in production. Through a scientific approach to the problem of metal redistribution, it has greater strength without any increase in over-all frame weight . . . has an even stress distribution that shrugs off high impact forces.

Equally important, the 6½ x 12 C-1 shares with other trucks in the National C-1 family — the 5 x 9, 5½ x 10, and 6 x 11 — the exclusive C-1 design vertical shock snubbing mechanism — the only friction snubbing mechanism service-proven to have been right — right from the start.

No matter which National Truck you specify, you get all these important C-1 Truck advantages: Smooth ride . . . longer wear life . . . proven maintenance economy of under 5 cents per C-1 Truck in service over a 14-year period. *Or, to put it another way, about one-third of a cent per C-1 Truck per year for maintenance!*

Transportation Products Division

RAILWAY PRODUCTS INSTITUTE MEMBER

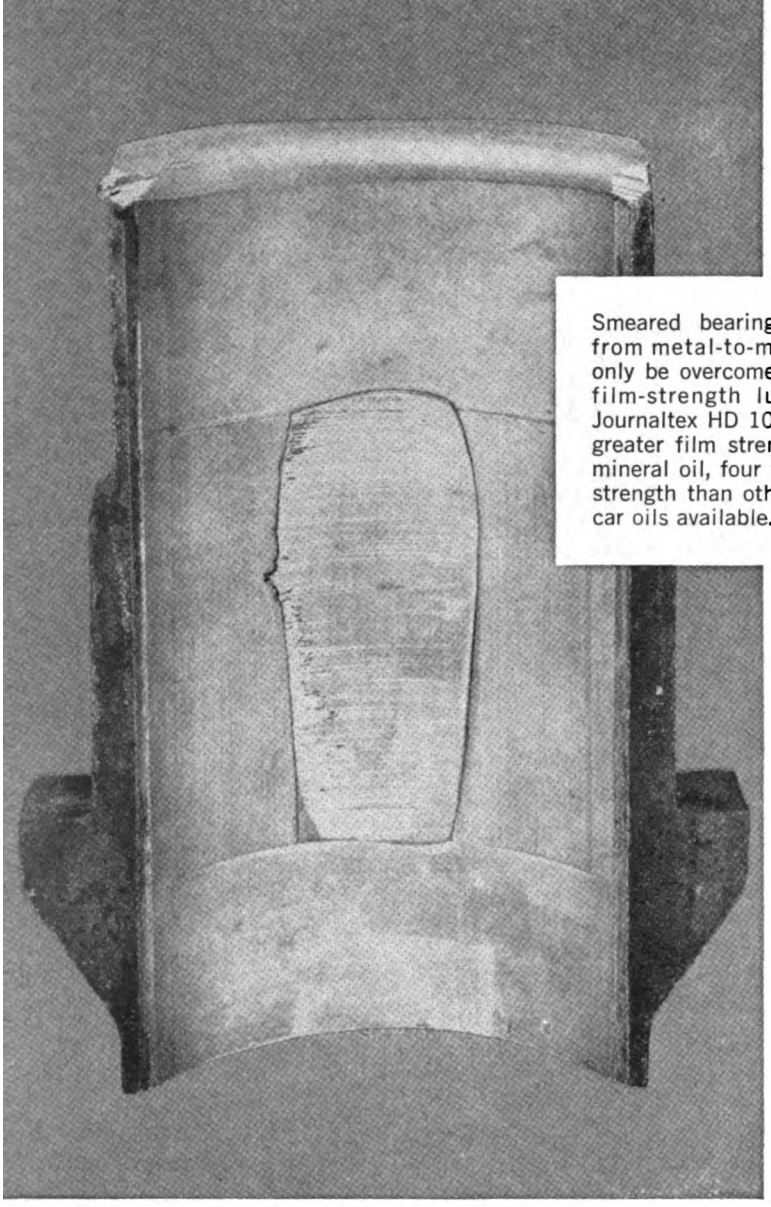
International Division
Cleveland 6, Ohio

National Castings Company of Canada, Ltd.
66 Portland St., Toronto 2B, Ontario

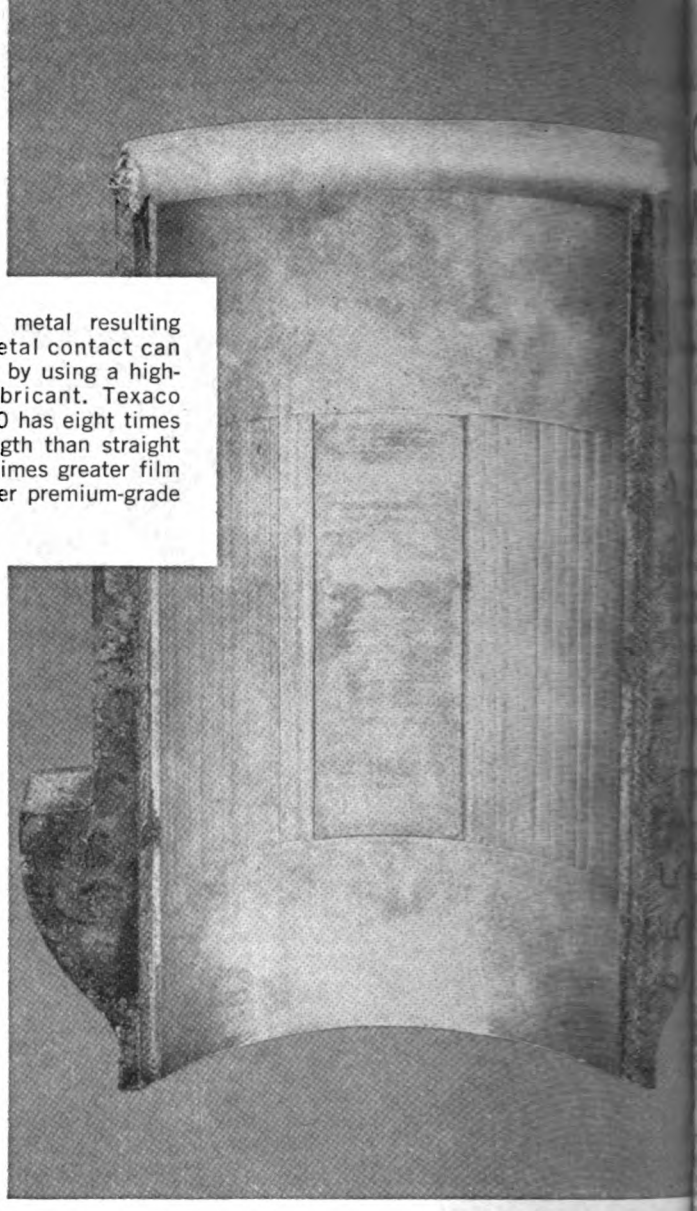
NATIONAL CASTINGS COMPANY
Cleveland 6, Ohio

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES
ROLLER BEARING ADAPTERS • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM

A-6754A



Smeared bearing metal resulting from metal-to-metal contact can only be overcome by using a high-film-strength lubricant. Texaco Journaltex HD 100 has eight times greater film strength than straight mineral oil, four times greater film strength than other premium-grade car oils available.



The difference is the 8 times greater film strength of Texaco Journaltex HD 100

MAKES BEARINGS RUN IN FASTER, COOLER

The lubricant used to run in the partial bearing at the left (an AAR M-906 car oil) just didn't have the film strength to hold up under high localized bearing pressure. Journaltex HD 100, used in the right-hand bearing, has eight times greater load-carrying capacity than straight mineral oil, keeps lubricating even under high pressure. Instead of smearing the metal, Journaltex HD 100 actually redistributes minute amounts of babbit, matches bearing to journal perfectly for maximum protection during the critical break-in stage.

After you've seen what Journaltex HD 100 can do for brand-new bearings, you'll be interested to see what it can achieve as your regular lubricant. For full details on how Journaltex HD 100 can cut hotbox set-offs and actually cut lube costs, call the nearest Texaco Railway Sales office. There's one in Atlanta, Chicago, New York, St. Louis, St. Paul and San Francisco. Or, write to Texaco Inc., *Railway Sales Division,* 135 East 42nd Street, New York 17, New York.

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REPORT FOR JULY

Coordinated Associations Meet September 17-19

J. F. Nash, vice-president, operations, New York Central, will be the speaker on Sept. 19 at the Railroad Presidents Luncheon, a regular feature of the Chicago meetings of the Coordinated Mechanical Associations. The Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations have completed programs for their three-day meetings which will be held Sept. 17, 18, and 19, at the Sherman House in Chicago.

Other speakers at sessions of the individual organizations include E. S. Marsh, Santa Fe president and chief executive officer, and H. R. Longhurst, assistant director, ICC Bureau Safety & Service, scheduled for joint meetings of the ABA and CDOA; H. W. Large, Pennsylvania vice-president and regional manager, at the RF&OOA, and W. D. Dickie, Canadian Pacific chief of motive power and rolling stock, at the LMOA. Programs for the four associations follow.

Air Brake Association

MONDAY, SEPT. 17. *Address:* E. S. Marsh, president and chief executive officer, Santa Fe. *Papers:* Brakes for Freight Cars—Westinghouse Air Brake Co.; Locomotive Air Compressor Synchronization—Central Air Brake Club; unannounced subject—New York Air Brake Co.; Preliminary Test for AB Valve Body and Parts—Pittsburgh Air Brake Club; 26-C Brake Valve in 24RL Schedule and Brake Cylinder Release Valves—Montreal Air Brake Club.

TUESDAY, SEPT. 18. *Papers:* Inspection, Testing and Operation of Trains as required by Power Brake Law of 1958 and Cold Weather and its effect on Train Operation (in joint session with CDOA); Testing, Malfunction and Remedies of 26L Brake Equipment—Manhattan Air Brake Club.

WEDNESDAY, SEPT. 19. *Papers:* A Review of Appurtenances Added to the AB Freight Brake Equipment—St. Louis Air Brake Club; unannounced subject—Canadian National Railways.

Car Department Officers

MONDAY, SEPT. 17. *Address:* E. S. Marsh, president and chief executive officer, Santa Fe. *Reports:* Road-Rail Transportation; AAR Loading Rules; Interchange and Billing for Repairs to Cars, TOFC Trailers and Containers.

TUESDAY, SEPT. 18. *Address:* H. R. Longhurst, assistant director, ICC Bureau Safety & Service. *Reports:* Light Repair Track and Train Yard Operation (in joint session with ABA); Freight and Passenger Car Equipment—a) Design, maintenance and upgrading of freight car equipment, and b) Passenger-car maintenance; Painting; Maintenance and Servicing Mechanical Temperature Controlled Systems of Refrigerator Cars, TOFC Trailers and Containers.

WEDNESDAY, SEPT. 19. *Reports:* Wheels, Axles, and Wheel-Shop Practices; Car Lubrication. Comments by W. M. Keller, vice-president (research), AAR.

Fuel and Operating Officers

MONDAY, SEPT. 17. *Address:* H. W. Large, vice-president and regional manager, Pennsylvania. *Reports:* Safety—Cost Involved and Prevention; Wheel Slip; Panel Discussion on Train Handling, including 24RL and 26L.

TUESDAY, SEPT. 18. *Paper:* Operation of the U-25 2,500-hp engine—General Electric Co. *Reports:* Panel discussion on Loss and Damage Prevention; Elimination of Oil Marker and Classification Signals; Panel discussion on Terminal Delays and Yard Operation; Proper Procedure in Conducting Investigations; Economy in Use of Fuel Oil.

WEDNESDAY, SEPT. 19. *Reports:* Panel

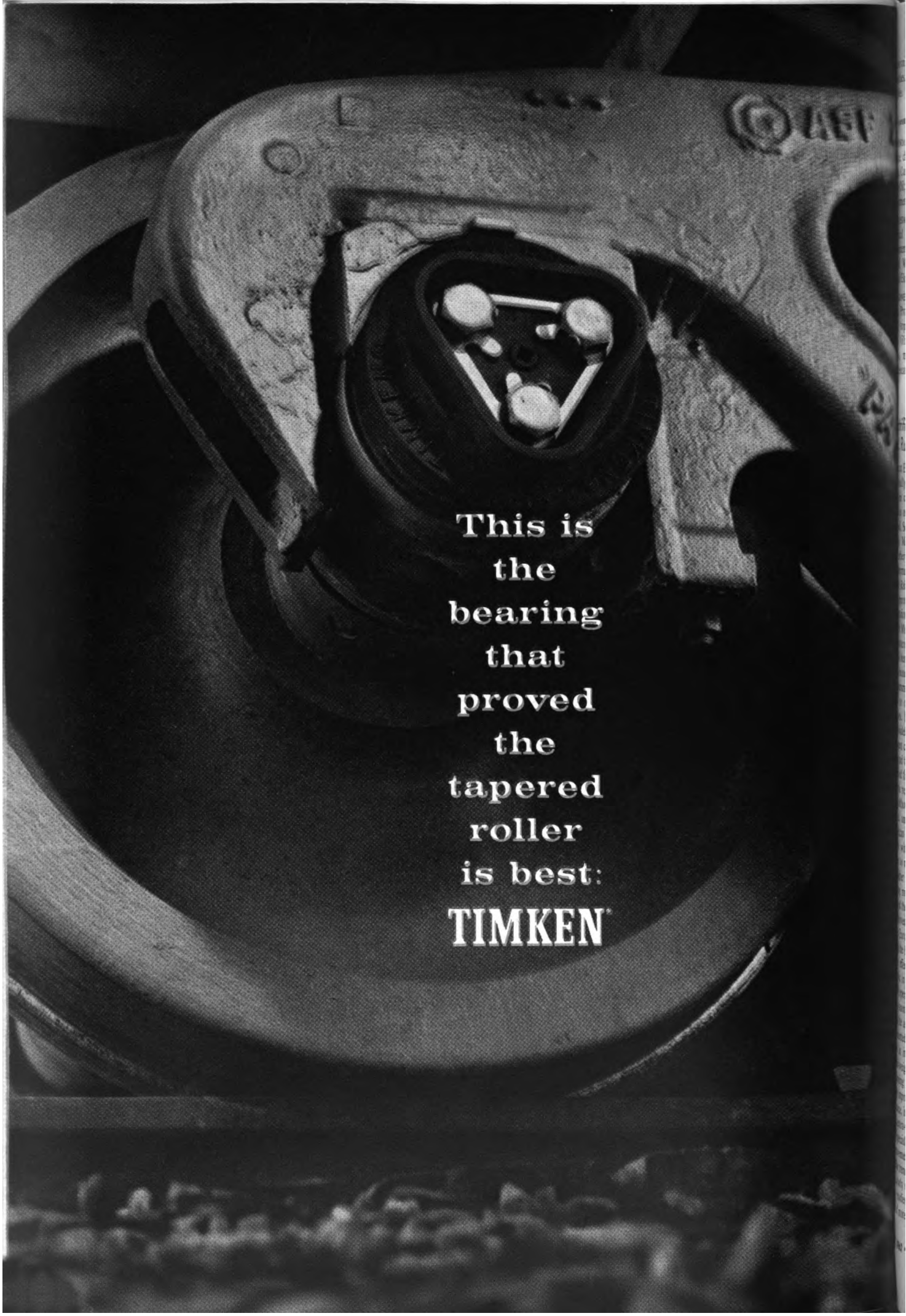
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ocomotive Maintenance Officers

ONDAY, SEPT. 17. *Address:* W. D. ie, chief of motive power and rolling , Canadian Pacific. *Reports:* Fuel and Oil; Diesel Engine Maintenance; Shop pment.

UESDAY, SEPT. 18. *Reports:* Diesel Me- ical Maintenance—Other; New De- oments in Motive Power Maintenance; el Material Inventory and Control; el Electrical Maintenance.

EDNESDAY, SEPT. 19. *Special:* What 's Problem (subjects not covered by topics); Diesel-Hydraulic Locomo- (illustrated presentation) — P. V. n, manager, mechanical engineering research, Southern Pacific.

ctrification Possible, J. Russell Says

cent European developments might lead tually to economical use of electrific a- on certain sections of our railroads, as on heavy mountain grades," D. J. sell, Southern Pacific president, said re- ly. Mr. Russell discussed electrification other motive power and rolling stock elopments in his speech on "The United es Railroads: Developments, Problems Opportunities" before the twenty-eighth rnational Railway Congress recently in Munich, Germany. "We are looking, interest," he noted, "at recent develop- ts here in Europe where means have found of utilizing electric current from commercial frequency distribution net- k to operate higher horsepower loco- ives. In the U.S. electrification has not widely adopted because of the high in- ment cost in structure and catenary sys- s and the need for direct current or non- dard frequencies."

Vith regard to diesels, Mr. Russell said , although diesel-electric design has im- ved and is continuing to improve [on erican roads], "experimentation con- es with still other types of motive er to meet our growing needs for units higher horsepower. Two railroads, in- ding my own, are testing several large s of the diesel-hydraulic locomotive that proved so popular in Germany and in er European countries . . . Locomotives g the hydraulic drive principle may be- e effective competitors of the diesel- tric in handling the faster and heavier ns operated in the United States, but it oo soon to be certain."

n the area of rolling stock, Mr. Russell mmented, "the principal advances have n in increased capacity, stronger but ter-weight car construction, improved hioning and shock-absorbing devices, tly improved running gear and axle per- mance, interior damage-free loading de- es, extra-wide doors, and a variety of new s especially designed and constructed for movement of particular commodities.

The trend toward larger capacity cars is ticularly significant," he went on to say. ur studies have shown that moving a n of more heavily loaded cars adds rela- tively little to our operating costs. Thus the larger loads can be handled more efficiently, and our savings can be reflected in holding our rates at competitive levels, or in some cases reducing them to attract more traffic. The larger cars also make for greater car availability, since fewer cars are needed to carry the traffic."

First Trailer Case Settled by Arbitration

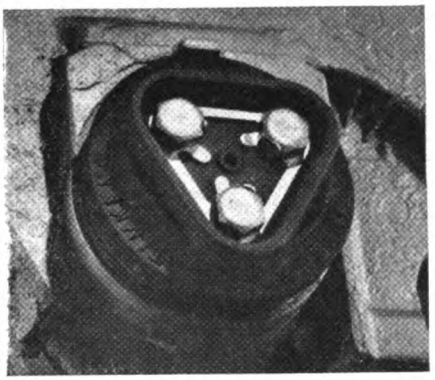
A charge against a trailer owner for replacement of dead batteries has been sustained by the Arbitration Committee of the AAR Mechanical Division in the first arbitration case involving the TOFC Interchange Rules. In the five cases concerning interchange freight cars which were considered by the committee during the past year, the contentions of car owners have been sustained in three. The other two were decided in favor of the handling lines.

TOFC Arbitration Case 1 involved two Boston & Maine trailers moving over the Western Maryland in January 1961 under Plan III (shipper-owned or leased trailers on railroad-owned flat cars). Upon arrival at the first WM terminal after being received in interchange from the Pittsburgh & West Virginia, the refrigeration units on both trailers were not operating and lading temperatures were too high. On one trailer a loose positive battery terminal connection was found. The batteries, replaced with fully charged units, were themselves rechargeable and were held by the WM for reuse. On the other trailer, the battery cable was grounded on the frame, and it was found that the battery could not be recharged. WM billed B&M for the batteries and labor of application, less salvage, in accordance with Rules 101 and 102. B&M contended that Rule 86 had not been observed prior to leasing and that battery charging is a service function of the handling line which could have been done with batteries in place on trailers. The decision of the Arbitration Committee authorized the WM charge against the B&M, owner of the trailers.

Transfer of ownership of 36 GATX tank cars to General American of Mexico involved the stenciling on them of new reporting marks and numbers which GAM requested be done by Petroleos Mexicanos. PM billed GAM for stenciling on sides and ends of tank, basing charge on Item 147 of Rule 107, and for stenciling on center sill and truck bolsters, basing charge on Item 149 of Rule 107. GAM contended Item 147 should cover all this work, refusing to make payment for stenciling on center sill and bolsters. Decision on Case 1861 did not sustain car owner, stating: "The stenciling of cars was not done to preserve the identity of same, but consisted of a change in the reporting marks and numbers, and work was performed at the request of the owner, for which the repairing company should be properly reimbursed."

Perfect Packed Products, owner of a pickle tank car which arrived at the firm's New York City plant allegedly damaged, contended that the defects were the responsibility of delivering Long Island Rail Road,

(Continued on page 10)



PROVED THE TAPERED ROLLER BEST

Back in 1929, there were four different kinds of anti-friction bearings offered to the railroad industry. Problem was, which one could do the job most efficiently, most economically.

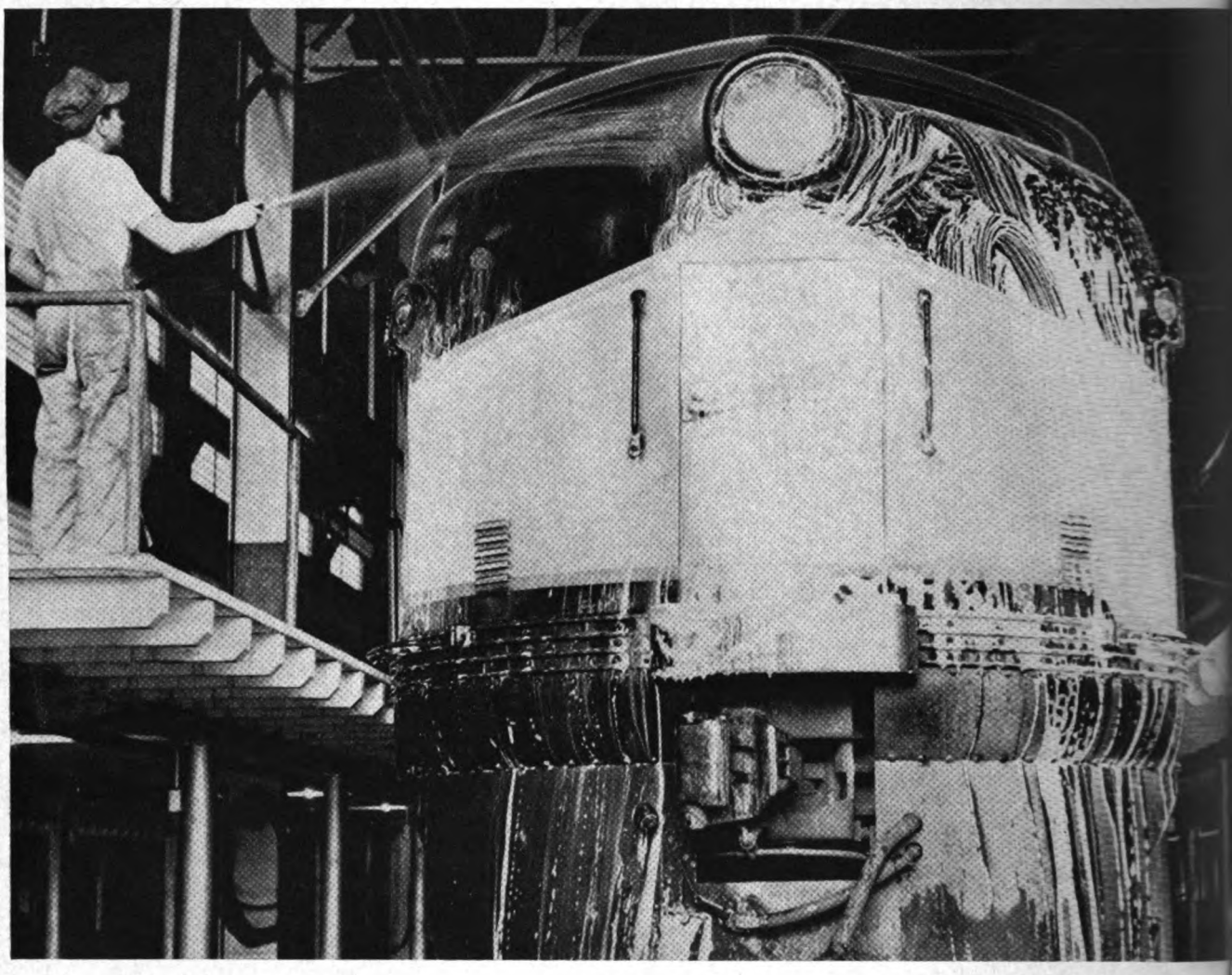
The Timken Company solved it. Today virtually all anti-friction railroad bearings purchased are of tapered design. And most manufacturers have switched to this concept pioneered by the Timken Company.

Timken® railroad bearings have proved that the tapered design is best with millions and millions of trouble-free miles—even in high-speed, heavy-duty service on America's freight cars. On the average, Timken heavy-duty "AP" bearings roll over one-hundred million car-miles between setouts due to overheated bearings. They reduce terminal bearing inspection time drastically and cut lubrication cost as well. Timken tapered roller bearings are precision-made from our own nickel-rich steel to insure the high uniform quality needed in rugged railroad service.

Today, 110 railroads and other car owners have found that Timken railroad bearings are one of their best investments in lower operating and maintenance costs and in faster, more dependable service. The Timken Roller Bearing Company, Canton 6, Ohio. Also makers of fine alloy steel and removable rock bits.

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What's NEW in diesel washing?

OAKITE 202—that's what's NEW!

In railroad maintenance shops throughout the country, word is getting around that today's best buy in diesel-washing compounds, is the new, liquid detergent—Oakite 202. Why all the excitement about 202? Because it is giving cost-conscious roads all the economy, efficiency, versatility and safety they can use these days. Oakite 202 is definitely adding more power to their manpower.

This many-purpose material makes a quick mix with water. It forms a rich, sudsy solution that cuts clear through road film, bug juice, oil—even light carbon.

Oakite 202 is rough on soil, yet it's easy on equipment surfaces . . . safe for aluminum, stainless, paint, plastic, decals. This extra measure of safety, plus 202's vigorous detergent action make it the perfect choice for cleaning passenger car interiors, too. One important road puts it to work cleaning lounge and dining car carpeting. They call it "the universal cleaner"!

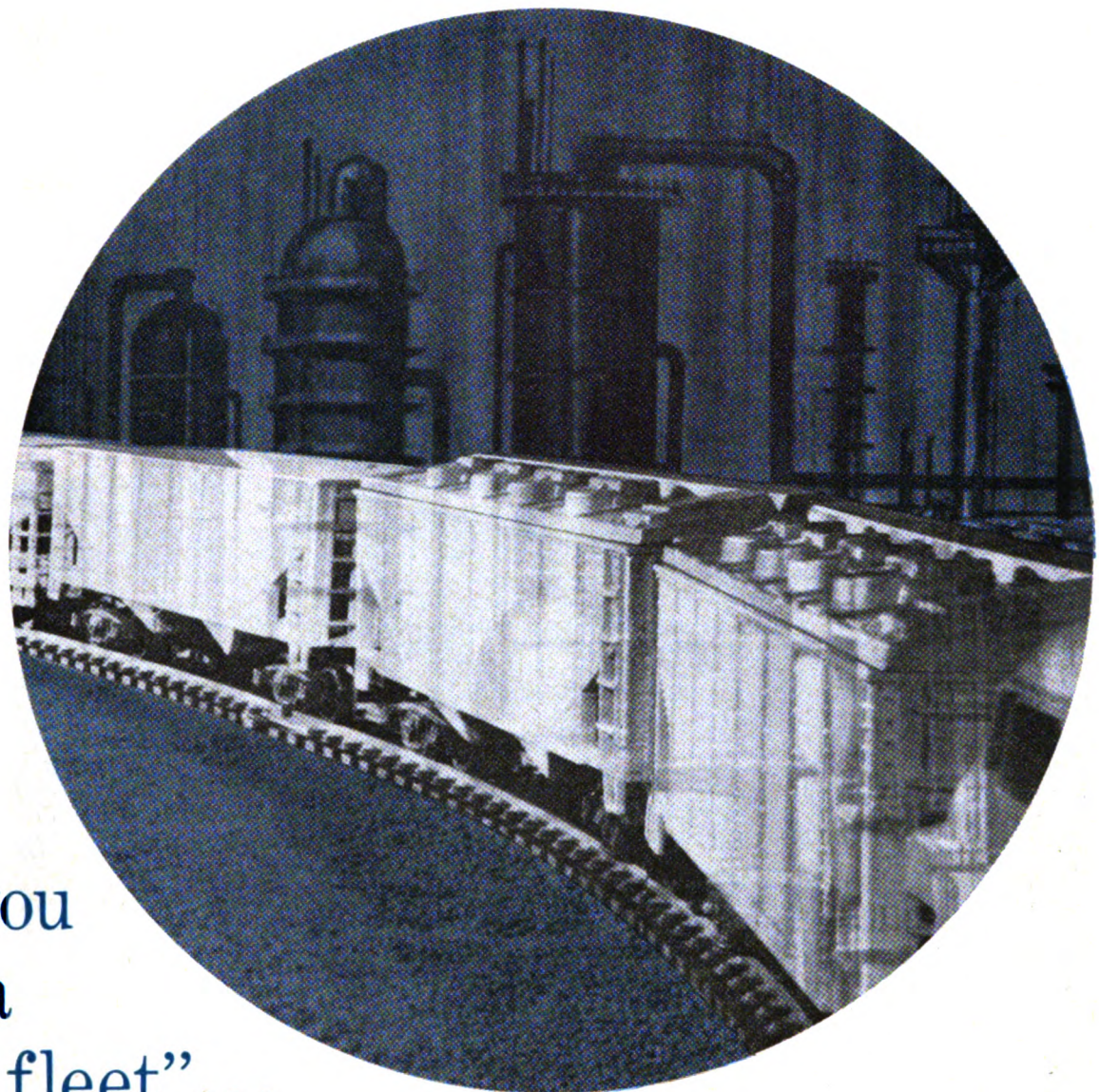
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because you use low cost paint for chemically corrosive service?

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Result: costly cars are "eaten alive". The pennies you save on low cost paint come home to haunt you.

Using Freight Liner 510 solves this very serious problem. It costs slightly more initially, but Freight Liner 510 does not need recoating for several years when properly applied . . . even under severest corrosion or abrasive conditions.

Talk to us soon about actual case histories of Freight Liner 510-coated cars that have been hauling salt, sulphur, salt cake, soda ash, potash, sand and other car-crippling commodities. Find out exactly how you save money by specifying the best corrosion resistant coating money can buy . . . Freight Liner 510.

Freight Liner 510

ADM CHEMICALS

ARCHER DANIELS MIDLAND COMPANY 700 INVESTORS BUILDING MINNEAPOLIS 40, MINNESOTA

(Continued from page 7)

citing Interchange Rules 32 and 44. LI pointed out that the car continued in service and contended that a subsequent inspection showed evidence only of ordinary wear and tear in fair service. Decision in Case 1862 did not sustain car owner, saying: "Evidence submitted does not substantiate claim that the defects in question are subject to Rule 44 or any unfair handling under Rule 32."

On three separate occasions in 1957 and 1958, Burlington box cars rated by that road as "suitable for grain loading or better," were loaded with fish meal on the Mississippi Export Railroad. The Burlington subsequently sought defect cards from the ME for contamination damage. The ME said it rated each of these cars as suitable only for rough freight, and that fish meal need not be a cause for contaminating any car if the car is properly cleaned at destination. CB&Q said cleaning did not remove contamination in these cars and that each car had to be relined. The Arbitration Committee in Case 1863 decided that the Mississippi Export was responsible under Rule 32, Section 12(a).

In 1961, a Louisville & Nashville loaded 50-ton hopper was found to be buckled in a Chicago & Eastern Illinois yard near Chicago after coming over the C&EI following its interchange from the L&N at Evansville, Ind. The C&EI train in which the hopper had been moved had done considerable switching en route and one of the cars had to be set out after sustaining a broken coupler. C&EI contended the sill damage was an owner's defect under Rule 44 and Arbitration Case 1846. L&N contended that, since C&EI could not fix the time and location of the damaging impact, damage should be considered a handling line defect under Rule 112 and Rule 44, Section D. Case 1864 was decided in favor of car owner, the L&N. "Handling line has failed to establish definite circumstances under which the damage occurred and, since train was switched a number of times en route, contention of car owner is sustained," the Arbitration Committee said.

In the only arbitration case involving passenger cars, the Florida East Coast sought a defect card for one of its diners received in interchange with slid flat wheels from the Atlantic Coast Line at Jacksonville, Fla. Actually, this was one of several cars in the same train with flat wheels. ACL issued defect cards for all others under PC Rule 4. It refused to issue card on the diner because the Richmond, Fredericksburg & Potomac, which turned the train over to the ACL at Richmond, Va., had advised this car already had flat wheels. RF&P does not subscribe to Passenger Car Interchange agreement, but is party to FEC-ACL-RF&P agreements covering equipment used in New York-Florida joint service which call flat wheels an owner's defect, except in case of accident. Case 1865 was decided in favor of FEC, the car owner, fixing the damage as a delivering line (ACL) defect. "In the interchange of passenger cars between two subscribers to the AAR Interchange Rules, the provisions of Passenger Car Rule 4 will apply," the Committee said.

Orders and Inquiries for New Equipment

Placed Since Closing of June Issue

Diesel-Electric Locomotive Orders

PENNSYLVANIA.—*General Electric:* 7 2,500-hp U25B diesel-electric units for freight service. Deliveries to begin in August.

Freight-Car Orders

BOSTON & MAINE.—*United States Railway Equipment Co.:* 10 steel cabooses; 15 70-ton hopper cars.

CANADIAN NATIONAL.—*Dominion Steel & Coal:* 500 50-ton, 40-ft insulated box cars. Delivery scheduled for October-November.

CLINCHFIELD. — *Pullman-Standard:* 20 90-ton covered hoppers. Cost, $283,400. For late July delivery.

DETROIT, TOLEDO & IRONTON.—*Pullman-Standard:* 100 90-ton covered hoppers. Cost, $1,300,000. For immediate delivery.

E. I. DU PONT DE NEMOURS & CO.—*General American:* 65 covered hoppers.

GRAND TRUNK WESTERN.—*Pullman-Standard:* 112 70-ton, 50½-ft box cars. For August delivery.

KANSAS CITY SOUTHERN.—*General American:* 7 23,000-gal tank cars. Incorrectly reported as ordered from Pullman-Standard in June issue, p 8.

MONSANTO CHEMICAL CO.—*General American:* 50 Dry-Flo covered hopper cars.

NEW YORK CENTRAL.—*Company Shops:* 150 70-ton covered hopper cars. For delivery this summer.

PACIFIC FRUIT EXPRESS.—*ACF:* 50 70-ton flat cars. Delivered.

SOUTHERN.—*Thrall Car:* 60 100-ton, bulkhead, chain tie-down equipped, heavy duty flat cars. Cars, for lumber handling, scheduled for early fall delivery. Cost, approximately $1,000,000.

UNION TANK CAR.— *Company shops:* 39 20,000-gal, 1 16,000-gal, 25 12,000-gal, 21 10,000-gal, and 1 8,000-gal capacity tank cars.

Notes and Inquiries

Chicago Transit Authority will buy 180 new elevated-subway cars costing about $15,000,000 when it receives proceeds of $7,500,000 loan from Housing and Home Finance Agency, according to Walter J. McCarter, CTA general manager. New cars would incorporate the latest advancements in this type equipment, including provision for fast starts and quick stops. They would replace 200 old cars, some of which have been in service 50 years or more. Entire order, CTA says, will probably go to a single builder. Deliveries would be completed by the end of 1963.

Southern Pacific is looking for a locomotive builder "interested in bidding" on 21 diesel-hydraulic road locomotives for high speed freight service. Reportedly, Alco Products, General Electric, General Motors, Henschel-Werke, Friedrich Krupp, Krauss Maffei, and Machinenbau Kiel are the U.S. and German companies contacted. According to an SP spokesman, "This is merely an exploration to determine what the potential for production of this locomotive will be. We want to find out who is interested in building them."

Trailer Train now has 10,200 flat cars in its piggy-back fleet, according to John E. Wightman, Jr., Trailer Train general manager, indicating that orders have been placed this year for more than 1,000 new cars, including 324 reported in January issue, p 7.

U. S. Government has awarded a contract to Thrall for conversion of 72 government-owned 40-ft box cars into ice bunker refrigerator cars for movement of perishable foodstuffs. Work includes reduction of overall height and installation of brake systems for use on foreign railroads.

N&W Discontinues Electric Operation

Electric operation on the Norfolk & W... ern ended July 1. By discontinuing ... electric locomotives in its only elec... territory—the 134-mile line between R... oke, Va., and Mullens, W. Va., for... part of the Virginian—the N&W s... diesel operation would bring greater ... bility. It will permit utilization of the ... for high-speed eastbound traffic, an ... merger goal. This has not previously ... possible because electric locomotives ... had to return over the single-track ... their westward trips.

Electrification of the Virginian be... Roanoke and Mullens, with an 11,000... single-phase, alternating-current ... was completed in 1926. The N&W ... cently reported the operation of ... Virginian electric-locomotives over ... line. It has been one of four 11,000... a-c systems in the U. S. and one of ... major roads operating electric freight ... motives. The other three a-c electr... tions of this type are the Pennsylv... operating both freight and passenger ... ice over 671 route miles; the New H... now running only electrified passenger ... ice over 106 route miles under cate... and the Reading with 84 miles used ... by m-u trains. Only other major elect... freight service now being operated is ... two sections of the Milwaukee Ro... 3,000-volt d-c system, aggregating 655 ... in Montana, Idaho, and Washington.

In 1950, ten years prior to its merger ... the Virginian, the N&W abandoned el... freight operation over a 52.5-mile portion ... its own mainline from Iaeger, W. Va., ... Bluefield, Va. Relocation of portions ... that line to reduce grades had made it ... sible to handle freight economically ... steam locomotives, avoiding changes of ... tive power at the ends of this compara... ly short section.

Thin Flange, Stamping Cause Wheel Failure

A broken wheel on a Railway Express ... frigerator car operating in a Milwa... passenger train caused a derailment in ... urban Chicago on January 6, 1962, the ... has reported. The car, seventh in a 15... mail train moving 69 mph, derailed wh... failure occurred in one of the multiple-... wrought-steel wheels on the rear truck. ... last nine cars of the train left the track ... juring 15.

The 33-in. wheel, Class AE, was m... factured and mounted in 1955 and inst... under the car when it was built that ... Examination of the broken wheel disc... a rim thickness of 1¼ in., a flange heig... $1\frac{13}{32}$ in., and a thickness of flange ... close to $1\frac{5}{16}$ in., the condemning limit... ICC stated. No visual evidence of ... heating was found, and there was no in... tion of this wheel having moved on the ... wheel seat. It bore the manufacturer's ... tification in ½-in. characters stamped ... maximum depth of ⅛ in. along about ... third the circumference of the back fa... the rim. At the figure "1" a radial fra...

(Continued on page 49)

A GREAT NEW TRANSPORTATION TEAM...



ERIE-LACKAWANNA

A NATIONAL BRUSH USER SINCE 1947

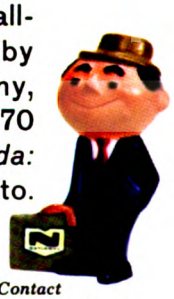
TRADE MARK

From the merger of two great transportation systems has come the Erie-Lackawanna..."The Friendly Service Route"... vital to the industrial heart of the nation... from New York to Chicago.

"National" brushes were first used on traction motors and main generators in 1947. Fifteen years of experience has proven the value of their performance on equipment operating in a highly competitive transportation area.

Excellence of commutation, minimum commutator maintenance, and long life have resulted in the use of "National" brushes on a majority of the system's total diesel electric horsepower.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.

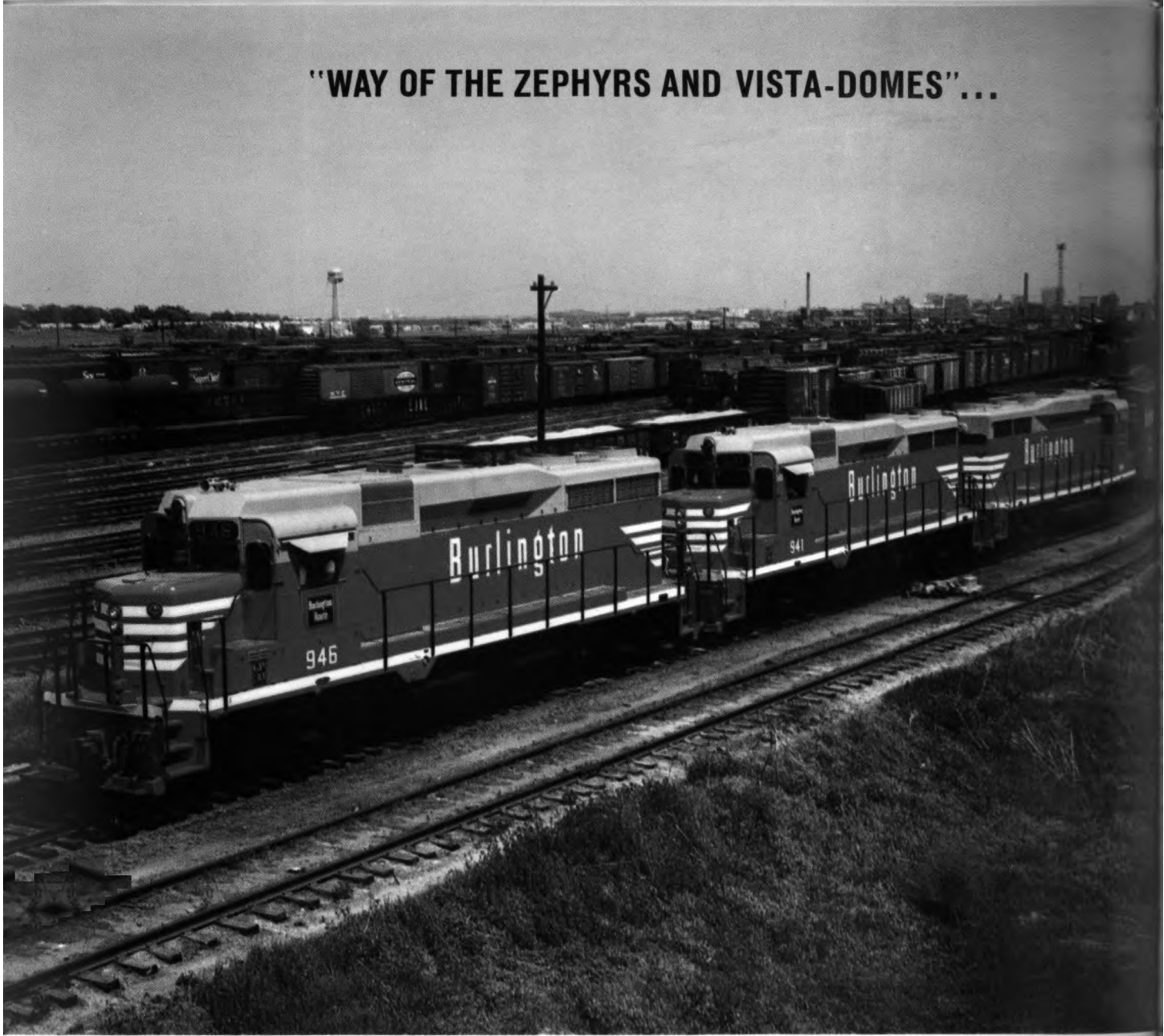


Contact Mr. National Carbon

UNION CARBIDE

"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY



CHICAGO, BURLINGTON AND QUINCY HIGHBALLS WITH NATIONAL BRUSHES

TRADE MARK

Starting at Lake Michigan, the 11,000-mile Burlington system serves an amazing complex of commerce and recreation—with connections to "Everywhere West."

Check a Burlington diesel anywhere on the system and chances are you will find "National" brushes on its traction motors and main generators. The system's high-speed service demands dependable commutation, which "National" brushes provide with minimum commutator maintenance.

The Burlington's original Zephyrs of the thirties were equipped with "National" brushes. Today these important components are used on the majority of the system's diesel units.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada:* Union Carbide Canada Limited, Toronto.

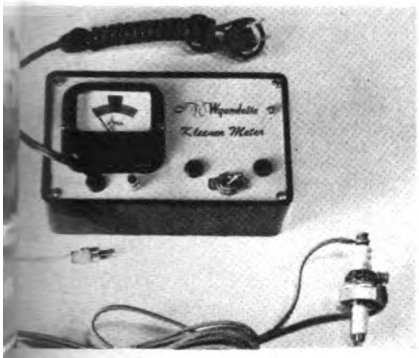


Contact Mr. National Carbon

UNION CARBIDE

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NATIONAL CARBON COMPANY



lution Meter

Kleener Meter is a heavy duty, elec-ally operated instrument for measuring ution concentrations in railroad soak-ning operations. It is said to provide a tinuous and easy method for determin-solution strengths throughout daily op-tions, and to eliminate the periodic need titrating solutions. The meter is 3¾ x 2 in. x 6¼ in. and operates on 115-t, 50-60 cycle a-c. Needle on dial tells ution strength at all times. Wyandotte emicals Corp.

For more information, circle 7-1 on cou-on page 51.



b Crane Attachment

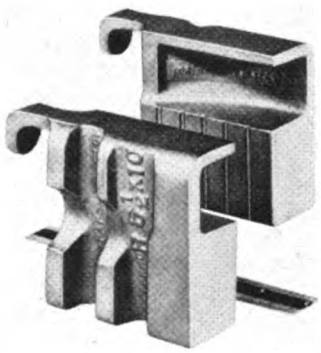
jib attachment, complete with electric ist, two-part line, and load block, makes Series FLT-20 Fork Lift available either a crane or as a lift truck. As a crane, it ll raise a 10-ton capacity load at a 10-ft ar reach, making it especially useful in ding and unloading gondolas. Its load ck, when fully raised, rests against an ti-pendulating device. As a straight-lift ck, the FLT-20 is rated at 40,000 lb. ith the side-shifting mechanism, which ves loads on forks laterally up to 6 in. m center, only one approach need be ade when stacking palletized loads. R. G. Tourneau, Inc.

For more information, circle 7-2 on cou-n on page 51.

enerator Brush

e National grade DE-8 brush, developed ecifically for diesel-electric main genera-tors, has been field tested, mostly in heavy freight service, by 11 railroads throughout the country. Results of the three-year tests totaling nearly three million miles indicate an expected increase in brush life expectancy of from 25 to 50%. Minimum life increase was 12%, with the maximum running as high as 68%, and incidence of copper drag was reduced by a factor of approximately 4 to 1. On one road, it is said, an original set of grade DE-8 brushes was subjected to a total of 21 months of continuous road freight service, including the test period, with no need for work on the generator commutator. National Carbon Co.

For more information, circle 7-3 on coupon on page 51.



Journal Stops

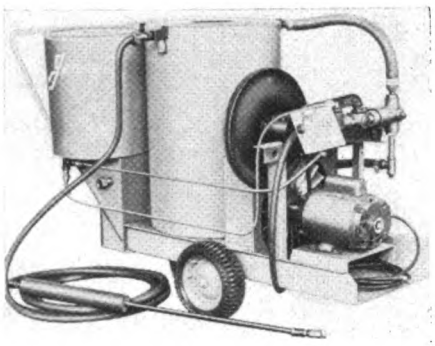
Curved slots in each pair of the new SPC journal stops slip over the bearing lugs on each side to prevent rearward movement and hold the stops securely positioned, keeping the journal bearings in place under service impacts. The stops, which have AAR approval for interchange service, are cast of high-tensile manganese bronze in two types—for ribbed and ribless boxes. They are said to continue to provide complete bearing-position control as the bearing wears. No drilling, welding, fitting, tools, or dismantling of trucks is required. Spring Packing Corp.

For more information, circle 7-4 on coupon on page 51.

Urethane Insulation

During manufacture, urethane foam is sandwiched between a variety of paper skins or facings to produce a rigid urethane board called Dyacor. The skins are said to eliminate powdering; reduce air, moisture and water-vapor penetration, and permit the use of low-cost adhesives in fabrication. The board, suitable for insulating trailers and reefers, can be processed in varying lengths, widths, and thicknesses at speeds up to 200 ft per min. Basic size is 4 x 8 ft, and thicknesses range from ½ to 2 in. in ¼ in. increments. Ultra Plastics, Inc.

For more information, circle 7-5 on coupon on page 51.



Cleaning Unit

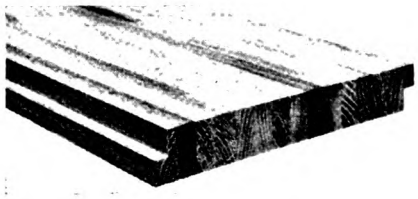
By changing the gun tip and the fuel valve setting of Jenny II, a steam cleaner and pressure washer, the 320-deg F steam cleaning spray is changed to a fog-free, fan-shaped 250-lb pressure spray. The unit has automatic electric ignition and is said to be in operation within 90 sec from a cold start. Homestead Valve Manufacturing Co.

For more information, circle 7-6 on coupon on page 51.

Triple-Purpose Cleaner

Zeal, a triple-purpose cleaner, is said to sanitize, deodorize, and clean passenger car interiors all in one operation. Precleaning before sanitizing is unnecessary. The compound is said to be harmless to the skin and safe for use on painted surfaces or other surfaces that water will not harm. Germs and bacteria are killed upon contact. Turco Products, Inc.

For more information, circle 7-7 on coupon on page 51.



Hardwood Flooring

According to tests conducted by the Wood Technology Laboratory, University of Michigan, Dura-Wood, a heavy-duty laminated flooring for freight and baggage cars, is "twice as uniform in strength as ordinary wood flooring." Electronic laminating processes and new waterproof glues are used to provide a smooth end-to-end surface, and wearing surface is edge-grain. The flooring, which is said to support loads up to 60,000 lb, is available in thicknesses from 1 to 2⅜ in., in increments of ⅛ in., and in widths from 4 to 12 in. It is shipped pre-cut to buyer's exact specifications. E. L. Bruce Co.

For more information, circle 7-8 on coupon on page 51.

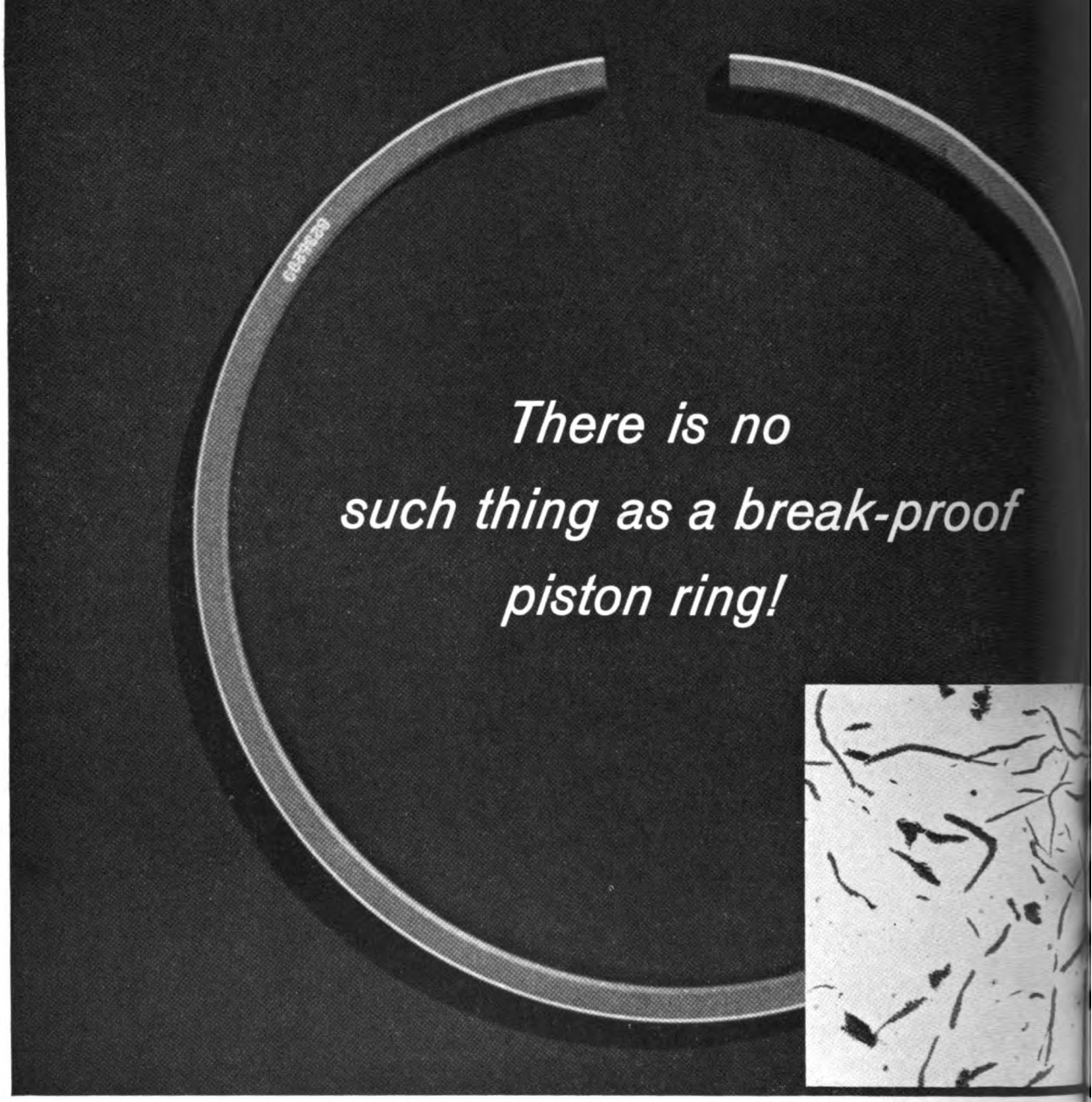


Illustration No. 1— GRAY CAST IRON
Typical graphite distribution
Original magnification 100X

Electro-Motive ductile iron piston ring stan

How do you make a piston ring that's strong, like steel, yet wears like iron—the kind you need in the top groove position?

We changed the molecular structure of the base metal. This makes Electro-Motive's Ductile Iron Piston Ring strong enough to stand up to repeated shock impact without breaking yet does not rob it of wearing quality.

Laboratory tests show that the Ductile Iron Ring has considerably greater resistanc breakage than regular cast iron, and in use Ductile Iron Ring is showing wearability approximates that of regular cast iron.

You can actually "see" the greater streng Ductile Iron through micro-photography. In ular cast iron (Illustration No. 1) graphite bution is in feathery bursts—an open invit to breakage. In Ductile Iron (Illustration N

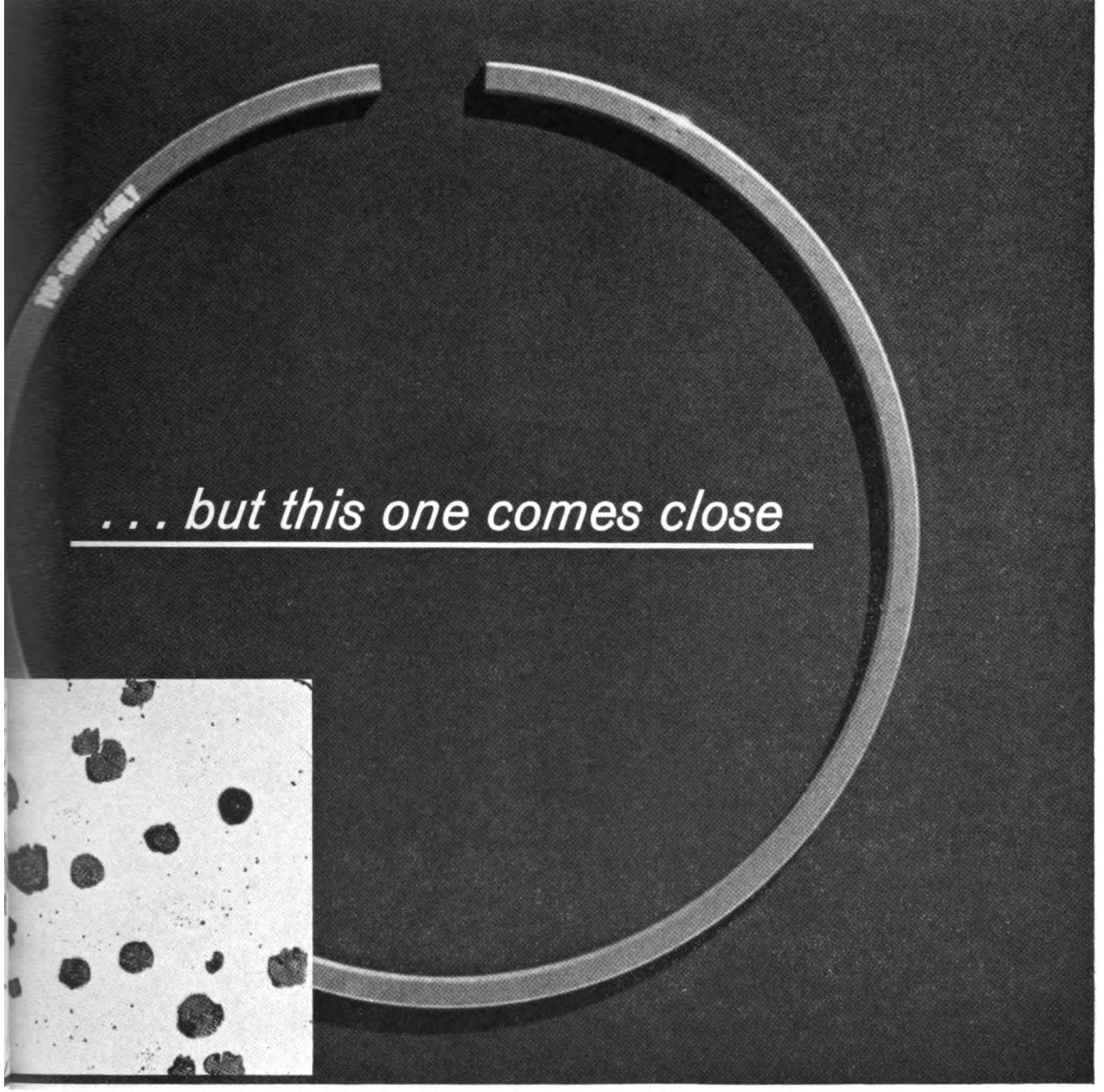


Illustration No. 2 – DUCTILE IRON
Typical graphite distribution
Original magnification 100X

p to shock impact, yet still gives good wear

graphite distribution is in nodular form, ring much greater resistance to breakage.
hould all piston rings be made of Ductile Iron?
necessarily. The Ductile Iron Ring is designed use in the top groove position on the piston, re the brunt of shock impact is felt. Electro-tive's standard cast or chrome plated rings he lower grooves will give good operational ciency and economy.

Electro-Motive's Ductile Iron Piston Rings are for use in all General Motors Locomotives. They are available individually or in chrome plated sets (for use with cast iron liners) or in ferrox filled sets (for use with chrome or cast liners). The top groove ring in all sets is Ductile Iron.

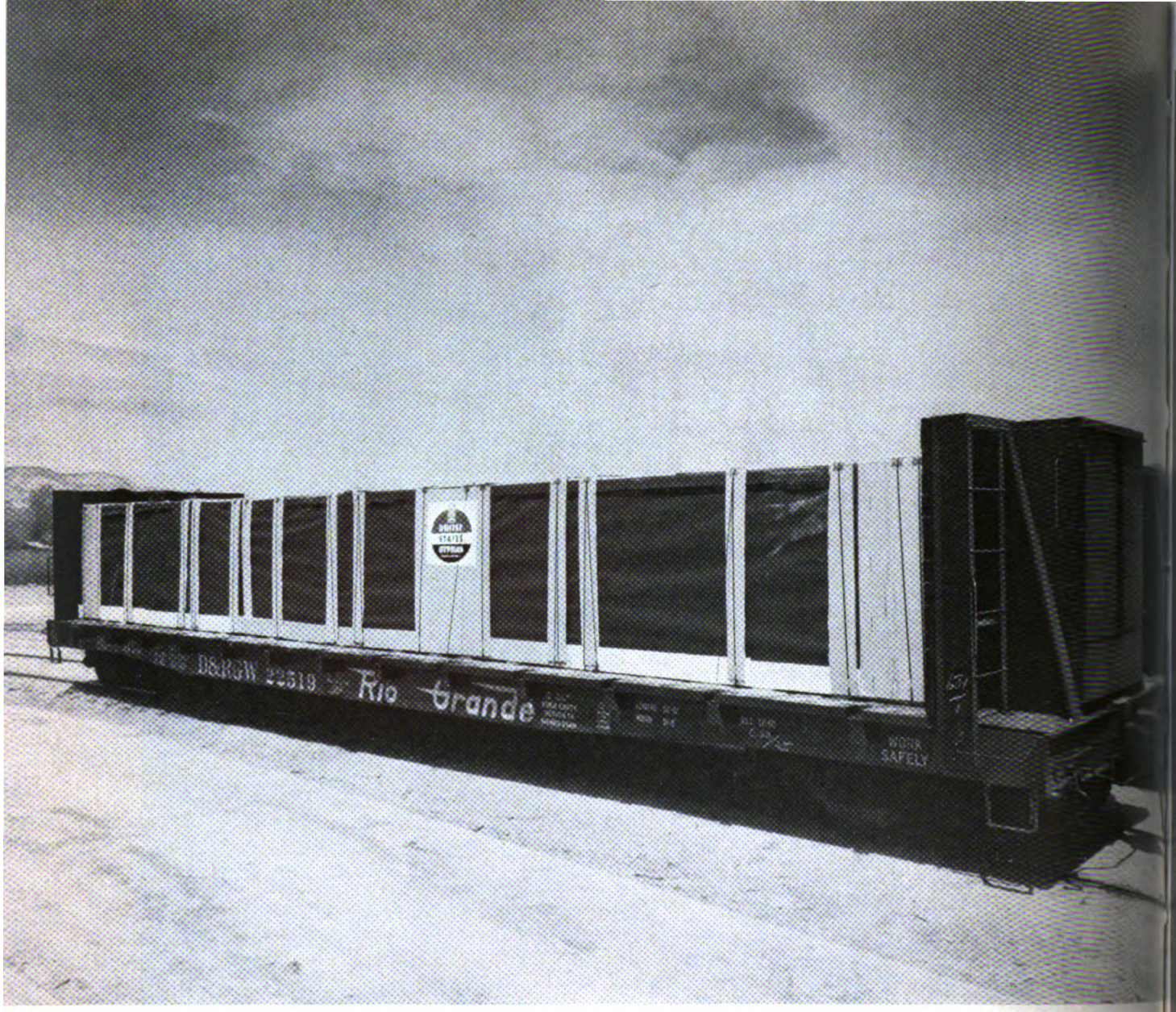
Ask your Electro-Motive Representative to give you complete details, or write to Electro-Motive Division, LaGrange, Illinois.

GENERAL MOTORS LOCOMOTIVES

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*

In Canada: General Motors Diesel, Limited, London, Ontario



"Best job-engineered car we've seen"...

Bethlehem's bulkhead flat car

Rio Grande adds 27 more to present fleet of 50

One top-level traffic executive describes Bethlehem's new bulkhead flat car as "the best job-engineered car we've seen." Fifty of these cars are now in gypsum-board service on the D&RGW, doing their job with gratifying efficiency. The Rio Grande has recently given Bethlehem an order for 27 more.

Designed to minimize the high maintenance expense typically encountered in bulkhead flats, this new Bethlehem car takes full advantage of the best features of heavy castings and rolled-steel structural sections.

Bethlehem's car shops are tooled to fit right in with the railroads' pressing need for more efficient rolling stock, whether of standard or special-purpose designs. And we believe our quality control is a front-runner in the car-building field. We'd like to discuss our set-up with you. Just put in a call to our nearest office.

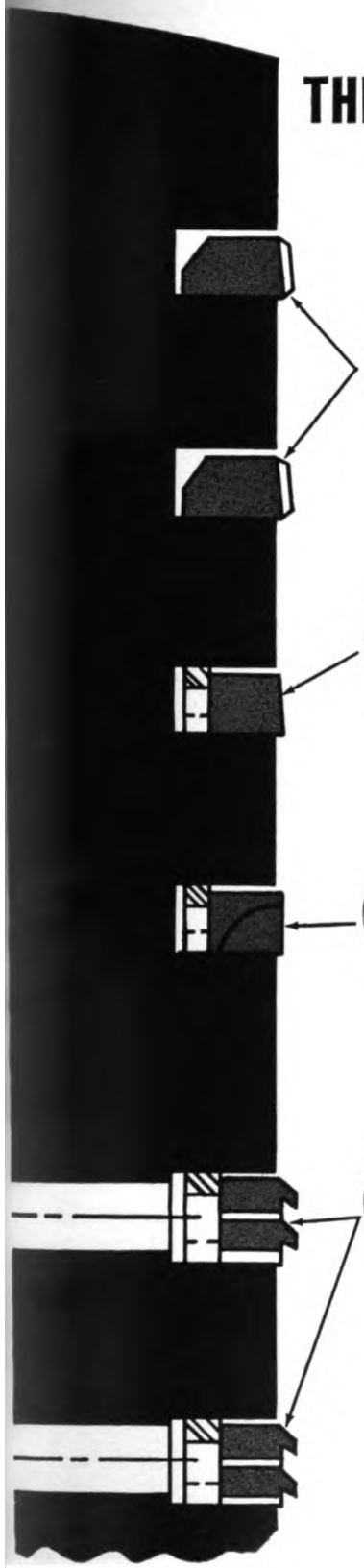
Steel *for Strength ... Economy ... Versatility*

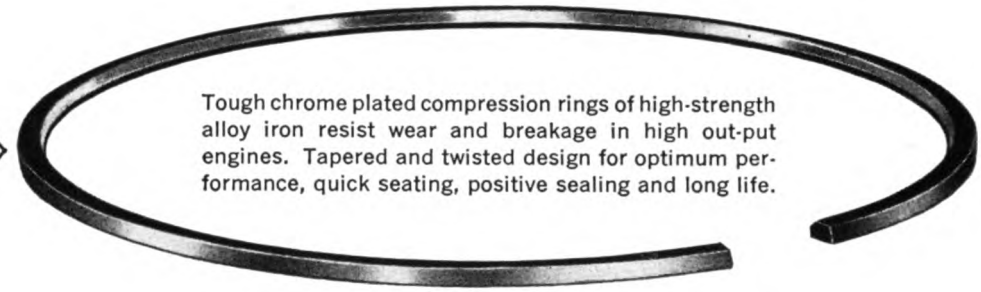
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

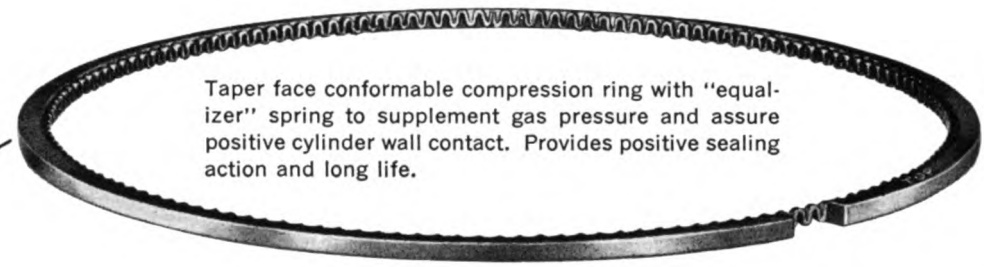
BETHLEHEM STEEL

THERE'S A Pedrick® RING FOR EVERY DESIGN NEED

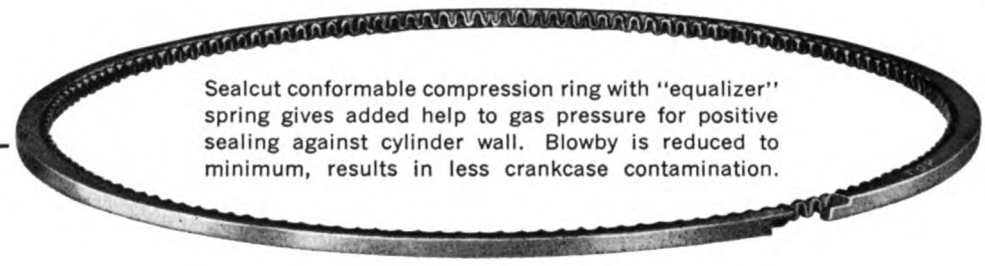




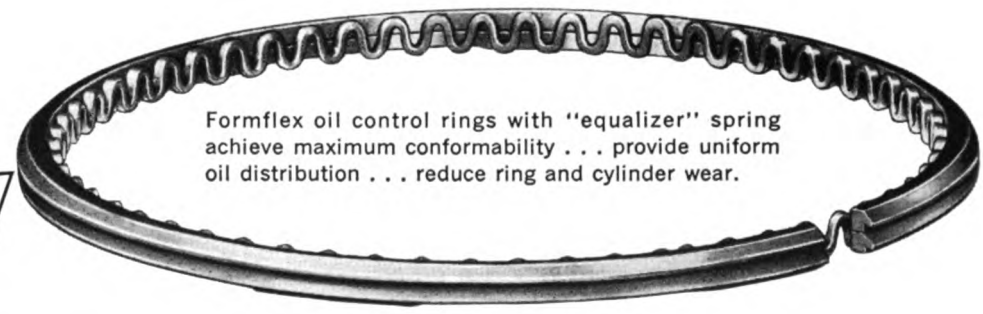
Tough chrome plated compression rings of high-strength alloy iron resist wear and breakage in high out-put engines. Tapered and twisted design for optimum performance, quick seating, positive sealing and long life.



Taper face conformable compression ring with "equalizer" spring to supplement gas pressure and assure positive cylinder wall contact. Provides positive sealing action and long life.



Sealcut conformable compression ring with "equalizer" spring gives added help to gas pressure for positive sealing against cylinder wall. Blowby is reduced to minimum, results in less crankcase contamination.



Formflex oil control rings with "equalizer" spring achieve maximum conformability . . . provide uniform oil distribution . . . reduce ring and cylinder wear.

This is a typical installation of Pedrick conformable rings in a 4-cycle engine. Other type compression and oil rings are available for a wide range of industrial and motive power uses. If you have a ring application problem, or need a special ring, write the Pedrick Engineering Department for prompt attention.

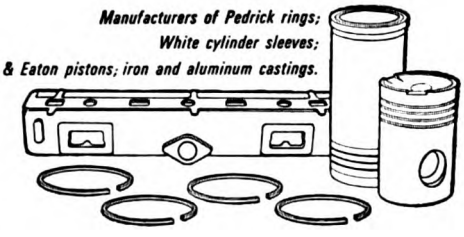
GOULD NATIONAL

ENGINE PARTS DIVISION

GOULD-NATIONAL BATTERIES, INC. / St. Paul 1, Minnesota

Superior-Arrowhead is a trademark of Gould-National Batteries, Inc.

Manufacturers of Pedrick rings; White cylinder sleeves; Gillett & Eaton pistons; iron and aluminum castings.



new SIOUX . . .



No. 1450

YOU'LL LIKE THE NEW SIOUX NO. 1450 AIR DRILL!

It's so light and powerful! It feels so right in your hand! Squeeze the trigger . . . it runs slowly at first so that you can get the drill bit started. Now *squeeze* the trigger for the full power and speed of the big 1/3 H.P. air motor! It's almost impossible to stall it. The motor can't be burned out. A remote exhaust system carries air and lubricant away from the work and the operator. The five vane air motor is automatically lubricated, as it runs, from a reservoir in the handle.

Change the speed to suit the work with an easy screwdriver adjustment! Compare any ¼" air drill with this one for power, quality, design features, and performance. We think you'll agree, this SIOUX air drill has got it!

It's shipped with deflecting silencer, eight feet of leader hose, and fittings including one swivel fitting all as standard equipment.

NO AIR?

then these dependable SIOUX electric drills and screwdrivers are for you!



No. 260
Powerful Screwdrivers with Choice of Clutches and Speeds



No. 1472
Advanced Design Super Powered Drills



No. 1495
One of the World's Most Popular ¼" Professional Drills

1/4" air drill!



SIOUX POWER cuts sanding costs!

SIOUX sanders-grinders

The SIOUX trade mark identifies dependable, long-lived sanding-grinding power. The SIOUX No. 1250 and No. 1267 are high speed, heavy duty 9″ and 7″ grinders of proven ability. They operate with cost-cutting speed and ease. The SIOUX No. 1253 is a light sander with a speed of 1400 RPM especially designed for feather edging. The SIOUX No. 501 is an air driven flat orbital sander with remote exhaust system.

SIOUX abrasive discs

Ask for the INDUSTRIAL type for heavy duty work such as reducing heavy welds; REGULAR for light welds and a wide range of other sanding applications; GRIND-A-LITE for sanding on light gauge metal such as autobody work and soft metals where non-loading is essential; OPEN COAT for use on paint, solder, aluminum and other soft metals and pre-finishing operations.

Ask your jobber for **SIOUX** *Catalog 62*

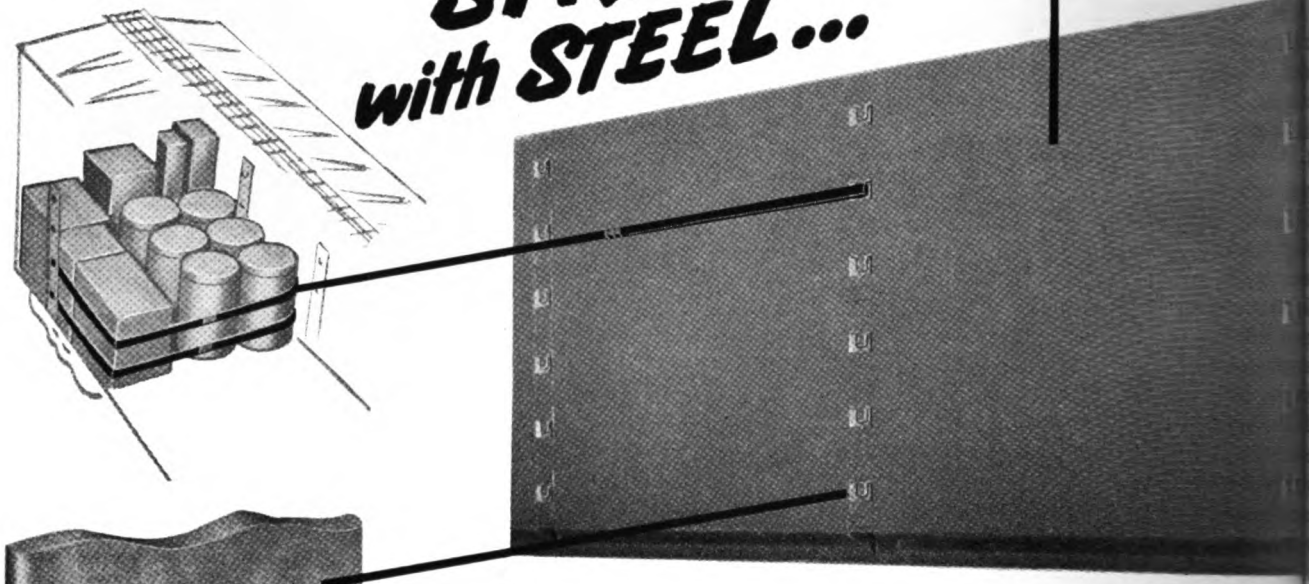


PORTABLE AIR AND ELECTRIC TOOLS, VALVE GRINDERS AND ABRASIVES

ALBERTSON & CO., INC. SIOUX CITY, IOWA, U.S.A.

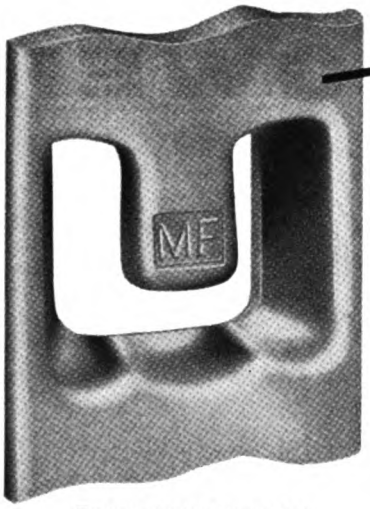
WRAP it in STEEL,

STRAP it with STEEL...

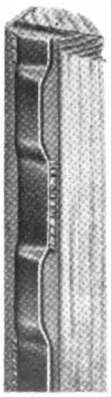


Independent survey reveals wood lining maintenance averages $80 per car per year

and ANCHOR it with M·F



Tongue design eliminates threading, gives constant tension, instant release. Note self-cleaning feature.



at right: M·F Door Post Anchor

CARRIERS: Smooth, batterproof steel is a *permanent*, NO maintenance lining.

M·F anchors in *any* style — continuous bar or individual; open-tongue, or closed; for steel, wood or plywood; for *any type of car;* in *as many* locations as desired — *always protect the lading and the lining!*

SHIPPERS: Smooth, splinter-free steel protects the *lading.*

M·F anchors, flush with the lining, offer NO projections to rip bags or damage cartons, crates and cans.

an M·F car is a Maintenance-Free car

MACLEAN-FOGG LOCK NUT COMPANY

5535 N. Wolcott Ave. Chicago 40, Ill. EDgewater 4-8420 / *IN CANADA: THE HOLDEN CO., LTD., MONTREAL*

DITORIALS

etter Communication

e effectiveness of railroad research programs is greatly reased by avoidance of overlapping and duplication work. This is one of the important suggestions made by M. Keller, vice-president, Research Department, As-iation of American Railroads, in his fine address on ne 28 before the AAR Mechanical Division's annual eting. With the relatively meager budgets for AAR and lroad research programs—about $10 millions per year Mr. Keller said we "cannot tolerate overlapping or plication if the fullest benefit is to be obtained."

During World War II it was recognized that duplication effort in research and development work was wasting ne, money and manpower. Between branches of the litary establishment duplication was wasteful but per-ps unavoidable. Within a single branch it was not only isteful but dismaying, frustrating, and considering the tical times, almost criminal. As a matter of fact, one kD division set out to make a complete record and com-e a history of every major item under its control to avoid petitious work and to escape the "blind alleys" that had en found by others in prior research projects. The solu-on to the duplication was then, as it is today, mainly one communications.

To avoid duplication Mr. Keller suggested these steps taken: publication of all laboratories' work, publica-on of technical society papers, and channeling of work rough a central organization. This adds up to better mmunications. We are in complete agreement with Mr. eller on the need for better communications between re-arch groups. However, we believe that his suggestion applicable not only to basic and applied research, but to ery development in the railroad field.

All railroads have a common goal and, in our trans-ortation system, are interdependent. No one railroad an exist by itself. Developments and ideas, like cars, ust be interchanged if the railroads are to survive and ogress. We believe organizations such as the AAR and iblications serving the railroad industry have been and ill continue to be important clearing houses in coordinat-g research and the reporting of developments. With this mmunication between research groups and between rail-ads the "fullest benefit" will be obtained. Without it, ne, money and manpower will be wasted.

What Is Your Problem?

he Locomotive Maintenance Officers' Association is add-g a new feature, a "What Is Your Problem?" panel ses-on, to its September 16-19 annual meeting program. We elieve it will also add to the value of the excellent service ow rendered by this organization.

One good reason for the panel session is the associa-on's desire to do a better job in serving the LMOA mem-er not attending the annual meeting. The association wants to help solve his problems as well as those of the more fortunate members making the trip to Chicago. Because all railroads have a common interest in locomotive maintenance problems and their solutions this publication has offered to help in the promotion of this project. The details are given on Page 47 of this issue.

A Million Miles

Only a few years ago the railroads that could boast about membership in the million-mile hotbox club could be counted on the fingers of one hand. Even then, some folks had suspicions about the reporting and bookkeeping methods of certain roads that were in this elite circle. Now, AAR hotbox statistics for April, to be released soon, are expected to show *more than a million freight-car miles per hotbox* set-off between terminals as the *average* of *all* reporting railroads, an outstanding achievement.

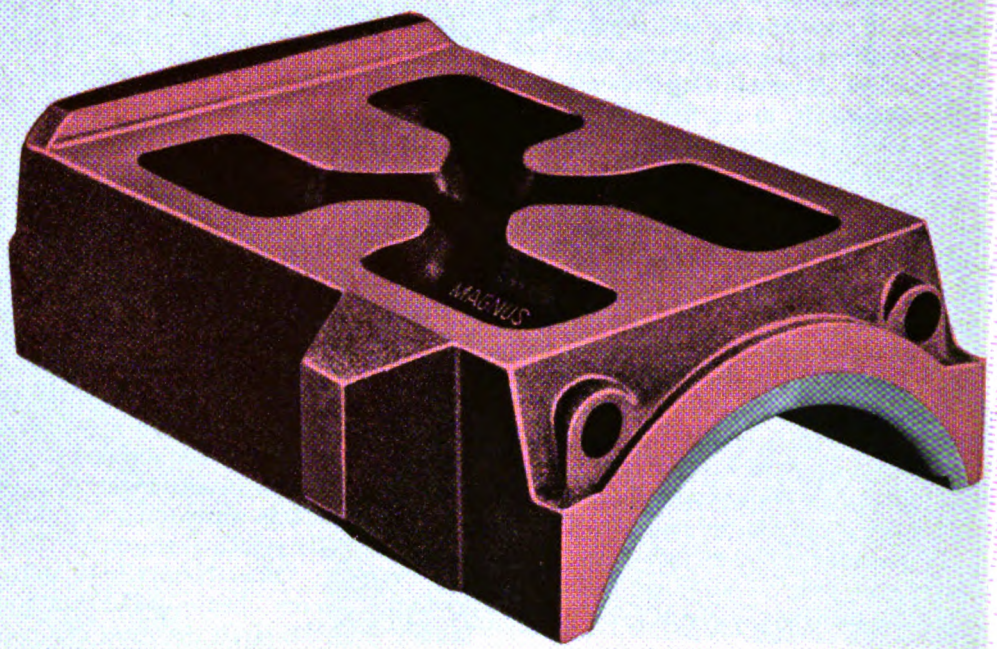
The switch from waste to pads as the lubricating medium has been the principal reason for the significant hotbox improvement. Other factors have influenced the sharp trend but this one change in the plain journal bearing assembly must be given the most credit for reaching this milestone in the history of railroading.

It is a milestone in every sense of the word. The know-how to reach and exceed the next milestone, the two million miles per hotbox mark, is already available. There is pretty general agreement that containment of axle movement by application of either flat-back bearings or journal stops will result in reaching this goal. When one railroad having over 3,500 cars equipped with flat-back bearings and pads records over 47 million car miles with only one hotbox over a four vear period, it's a safe bet that nationwide applications of either flat-backs or journal stops will make the two-million mile goal more a probability than a possibility.

The rapid rise in miles per hotbox has created new problems. One is the need to insure the journal boxes being oiled at mileage intervals that will prevent them from running dry. Another is one of hotbox detection. Telltale smoke signalled watchful eyes and keen noses that hotbox conditions existed in waste-packed boxes; pads under overheated journals in tightly sealed journal boxes do not emit a similar smoke alarm. This is the principal reason that the number of burned-off journals and derailments have not declined in the same ratio as hotboxes. These conditions are under study and effective measures to overcome these deficiencies will be taken within a reasonable period of time.

Many hotbox campaigns have been waged over the years by the railroads but they usually produced gains that were temporary and improvements that were local. The current hotbox performance is nationwide in scope and permanent in character. The AAR, the railroads and the railroad supply industry can be justly proud of their contributions to the achievement.

MAGNUS FLAT-BACK BEARINGS...



the LOW-COST way to stabilize journals and get still better freight car performance

Today, freight cars with lubricators average better than four times the performance with waste packing in 1954—and cost per car per year for journal bearing operation and maintenance has been cut more than half. Better still, total costs for *solid* bearings today are less than the fixed charges on the extra investment in roller-type bearings.

The next big step toward improved performance is the *flat-back bearing*—available from Magnus to AAR specification and design, in nominal and step-sizes. It effectively restricts fore-and-aft movement of the journal under all normal operating conditions—makes it possible for the bearing to remain seated on the journal and to provide uninterrupted lubrication.

Several leading railroads are applying flat-back bearings to all new standard interchange freight cars. One railroad is converting existing equipment to flat-backs at repack periods.

Flat-backs prevent excessive journal displacement—increase the efficiency and service life of present-day rear seals. They require no additional labor to install and, through improved performance, can quickly pay for the slight extra cost.

CURRENT ECONOMICS OF SOLID BEARING OPERATION



New economic study updates AAR Report 20,000 insofar as it covered solid bearing cost in 1954—shows how lubricators have cut these more than half despite increases in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, N.Y. or to 80 East Jackson Boulevard, Chicago 4, Illinois

MAGNUS

METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY

lechanical Division Meets New Needs

Higher speeds and heavier loads are presenting added problems in motive power and car fields

nproved standards and new de- s for cars and locomotives to ren- them capable of moving heavier s at higher speeds were prime top- t last month's meeting of the AAR hanical Division. While working ısure that railroads' rolling equip- t can meet the demands of today's petitive situation, the 34th meet- of the Division heard predictions ven higher speeds and heavier ing which will be required in the few years.

series of actions by the Division, ıded to promote efficiency and ıomy of operation, include:

Raising of the loaded limits on for practically all freight cars by , effective Aug. 1;

Continuing of various programs mprove journal-bearing perform- with mandatory removal of un- ıble lubricators as the latest step;

Revising of Interchange Rules to e possible machine accounting for hases of car repair billing;

Studying of new types of motive er and of possible improvements comotive control systems;

Organizing a group to establish lamentals of car design which will ct today's service requirements.

t the conclusion of the three-day ting in Chicago on June 28, J. A. sch, general superintendent mo- power of the Illinois Central, was ed as chairman for a two-year ı to succeed J. W. Hawthorne, f mechanical officer of the Atlan- Coast Line. L. E. Gingerich, chief hanical officer of the Pennsylvania, named vice-chairman. Railroad ıstration for the 1962 sessions was ; total registration, 963. Next ting of the Division is scheduled October 1963 in Chicago.

Practically all freight cars can be ed heavier after August 1. An in- se in permissible rail load limits follows the affirmative letter ballot vote, based on car ownership, which was reported to the AAR Mechanical Division. The Division was told that while the 5% increase in total loaded weight on the rail had been approved by 1,241,362 to 462,235, the large number of negative votes means that controversial Interchange Rule revisions to implement this increase (RL&C, June 1962, p 59) must again be submitted to committees.

Although all facets of the problem cannot be resolved by August 1, the new limits for load on rail for four-axle cars, to be effective then, will be as shown in the table.

No change is being made in the rail-load limit for 30-ton cars, only a few refrigerator cars of this type remaining in service. The increased loading would not apply to any car which has structural limitations that are indicated by a star ahead of the load limit stencil on the sides, nor to cars having lading weight restricted by ICC regulation. Actually, the 5% increase in gross rail load represents a somewhat greater percentage gain in carrying capacity.

Four-Axle Car Rail Load Limits

Nominal capacity, tons	Axle journal size	New limit, lb	Present limit, lb
40	5 x 9	142,000	136,000
50	5½ x 10	177,000	169,000
70	6 x 11	220,000	210,000
100	6½ x 12	263,000	251,000

Spring performance, axle life, and bearing wear can be involved in heavier loading of cars. F. Peronto, executive vice-chairman of the Division said in announcing the ballot results that, along with the increase in permissible rail loads, the Interchange Rules are being revised Aug. 1 to provide for installation of higher capacity spring groups in car trucks.

Mr. Peronto went on to report that the installation of lubricators in the journal boxes of interchange freight cars is virtually completed. He said that preliminary cumulative figures for April 1962 indicated that the national average was over 1,000,000 miles per hot box set out—highest AAR has ever recorded.

To expedite the removal of lubricating devices from which AAR approval has been withdrawn, the Division has acted to change the Inter-



J. W. Hawthorne (right), retiring Division chairman and ACL chief mechanical officer, receives certificate from J. A. Welsch, new chairman, and IC general superintendent of motive power. Looking on are General Committee members T. T. Blickle (left), AT&SF general manager—mechanical, and W. D. Dickie, CP chief of motive power and rolling stock.



"Are railroads losing flexibility of their freight-car fleet in effort to get back traffic?" asked W. T. Rice, Atlantic Coast Line president, discussing problems of special cars.



Mechanical Division committees perform an "impressive" service, C. D. Buford, AAR vice-president commented. Freight-car innovations are of great importance to railroads' future.



"Flexibility" was called mechanical officer's essential characteristic by O. H. Zimmerman, Illinois Central vice-president, explaining "he always has to be thinking ahead."



Research efforts of railr should be coordinated bec overall expenditure is so s W. M. Keller, vice-president- search, said. AAR could serv coordinating agency.

change Rules to allow any railroad to remove such lubricators at the cost of the car owner. Since lubricators were first introduced, 52 different types have been used, H. M. Wood, Pennsylvania, reported. He pointed out that 23 of these no longer have any AAR sanction. He went on to suggest that the AAR should have one standard lubricating device, probably one of those now in service. It could be licensed to all manufacturers. Little additional development can be expected in these devices because competition has so lowered prices.

A two-man "task force" has completed its review of the Rules of Interchange so that machine accounting can be used for interline car repair billing. All phases of this "punch card" car repair reporting and billing are to be incorporated in the next revision of Interchange Rules.

C. D. Buford, AAR vice-president, reported that one of the most significant activities of the Mechanical Division is its scheduled review of the fundamentals of freight-car design. A task force, to be established shortly, will study and up-date these fundamentals in the light of today's service requirements. He said that Mechanical Division committees have always been among the "most vocal, hardest working" groups in the AAR organization.

"The needs of the future," Mr. Buford predicted, "will involve new and improved motive power, larger cars carrying greater tonnage, better control of the environment of goods in transit, improved methods for controlling the shocks and impacts inherent in transportation, and simplified means of assembly and repair of cars. Containerization, which has transformed railroading in the last half dozen years, will certainly progress faster in the direction of a variety of small containers, bringing with it many problems."

W. T. Rice, Atlantic Coast Line president, raised questions about specialized freight cars, acknowledging that they can win traffic, but asking if railroads are sacrificing the flexibility and equipment pooling ability which has characterized the American freight-car fleet in the past. He urged adequate appraisal and testing of specialized freight-car designs to insure that railroads do not some day regret their investment in such equipment. These problems are the responsibilities of the mechanical officers of individual railroads and of the AAR Mechanical Division, Mr. Rice said.

Tomorrow's freight cars must be bigger, better, interchangeable, and more adaptable, Mr. Rice concluded. They must be easily kept in repair, and should be standardized as much as possible.

Foremost in rolling-stock developments during the next decade should be freight cars of higher capacities. That was the prediction of W. M. Keller, AAR vice-president—research, who discussed how progress in locomotives and cars has been achieved and how it can be continued and accelerated.

The next decade, Mr. Keller forecasts, should be marked by the introduction of 150-ton and 200-ton cars, 25,000-ton trains, a reduction of 30 to 40% in the freight-car fleet, 75-mph freight-train speeds, automatic car identification, and automatic operation of trains. "These goals will not occur just by saying we need them," he cautioned; "we will need research and technical development more t ever."

After citing progress made in proving car trucks, brakes, whe and journal bearings, Mr. Keller that such changes came about thro the efforts of the AAR Research C ter, the Mechanical Division comm tees, the suppliers, and the individ railroads. "We must examine all our activities toward developing concepts of equipment, maintena methods, materials and standards. must not only continue, but expa our research efforts. We need a be freight-car truck, better car und frames and superstructures, and better bearings. . . . At the Resea Center we are not satisfied with latest design of axle, particularly view of increasing the load it can by 5%."

Progress can be furthered by avo ing duplication of research. Mr. Ke suggested the publication of work d by all laboratories concerned with road problems, the publication of te nical papers by railroad and supp engineers, and the channeling of work through the AAR which has organization and facilities for s coordination.

"We estimate," he continued, "t the entire research program of AAR and railroads combined is proximately $10 million per year. which the AAR spends less than 10 In a research program as small as t there cannot be tolerated any overl ping or duplication.

"Another requirement for the fut is greater reliability of equipme Cars must be designed and built stay off shop tracks. . . . Required quent attention is an indication of adequate design or maintenance."

) Coal Turbine Is Completed

ıe Union Pacific 4,500-hp experimental fired gas-turbine-electric locomotive &C, July 1960, p. 26) was completed 1, 1961, and the first test firing, using vas made on Dec. 5, the Committee on motives and Locomotive Fuels and icants reported. Stationary testing with oil continued through December, fol- d by stationary testing with coal. Road are scheduled to be conducted between ha, Nebr., and Cheyenne, Wyo.—507).

ıe UP also continues to operate the fleet of gas-turbine locomotives—25 red 4,500-hp units and 30 oil-fired)-hp units. By Dec. 31, 1961, these lo- otives had accumulated over 1,028,584 hours, burning residual fuel. The Com- ee considers this a remarkable record use only eight other gas-turbine loco- ves have ever actually been operated vhere in the world.

he 4,500-hp GTE units made less mile- during 1961 than in previous years be- e they were stored during slack periods. se units were generally operated in mul- with one or more trailing diesel units. 1961, the 25 units produced 1.88% of freight gross-ton-miles on the UP, and aged 1,243 miles per month. By the of 1961, Locomotive 52—second GTE ed in service—had, since 1952, accumu- d 903,654 miles.

he 8,500-hp gas turbines produced 1% of the freight gross-ton-miles on the in 1961, and averaged 10,574 miles per nth. By the end of 1961, Locomotive 1 accumulated 411,045 miles since going service in 1958. Average number of d hours per turbine for 1961 was 4,361, ed on 31 power plants, including one re.

Three of the diesel hydraulic road freight omotives, built last year in Germany for . service, have operated since Nov. 1 on various Southern Pacific routes. &RGW experiences are reported on p. 42 Editor]. Each had accumulated approxi- tely 30,000 miles by March 31, 1962. eir performance has been considered y satisfactory. They have exhibited good eleration characteristics, can operate for g periods at speeds as low as 1 to 2 mph hout overheating of the transmission oil, ve good adhesion characteristics, and de- op a smooth application of power. Start- drawbar pulls up to 284,000 lb have en recorded for the three units without parating train.

The Voith transmissions are said to be isfactory. Automatic changeover from e torque converter to another is very ooth and occurs without interruption in wer transmission. The final drive ar- gement is, apparently, adequately de- ned. The Committee reports that the drodynamic brake design has met all ex- ctations and the performance has been tstanding. Operating personnel consider to be far superior to the electro-dynamic ake. Less automatic air braking is re- ired to control speed of train on heavy scending grades.

To overcome lack of engine combustion r in long tunnels, ducts have been in- alled to take air from a lower level rather than at the roof. This has partially corrected the condition. Fuel problems have been minimized by selecting the proper type of Grade B fuel. Other than removal of cylinder heads for increase in valve guide clearance, there have been no engine parts failures or renewals necessary.

The units, as built, were equipped with straight pneumatic controls for engine transmission and reversing. Service tests showed this system to be too slow and unreliable. It is now being replaced with an electro-pneumatic system patterned after standard American diesel-electric practice.

Improved Filtration

The Committee on Locomotives and Locomotive Fuels and Lubricants has been cooperating with the AAR Research Center in a program to improve filtration of fuel, lubricating oil and air on diesel locomotives.

For standardizing wayside fuel filtration systems, the Committee is urging use of standard lube-oil filter elements approximately 30-in. long and 6-in. dia. Improvements in fuel-oil filtration systems are being sought which could eliminate sintered bronze filters.

Depending on the filter plugging characteristics of fuel, the Committee indicates it may be desirable to have a relatively porous depth-type element ahead of the pleated-paper element. With economy fuels containing considerable filterable material, a standard lube-oil cotton-waste element can serve as the depth-type filter.

Evaluation tests of lube-oil filter performance are being made by member roads. Recommended for improvement are full-flow filtration systems. Filter cans might be eliminated and the use of an external by-pass and higher by-pass settings should be considered. The Committee aims to prepare specifications for lube-oil filter elements, housings and testing procedures.

The group is following new developments in carbody and engine air filtration such as the disposable fibrous carbody filter, the inertial self-cleaning primary filter, the centrifugal self-cleaning engine filter, the multiple cyclone-tube primary air filter and extended-surface dry secondary filter.

The Committee has been studying the seven known locomotive fueling systems. With suitable adapters the nozzle of the one system may be attached to the locomotive tank fitting of any other system. The Aeroquip, Buckeye, Houston and Sweeney systems shut off automatically when both the nozzle and the locomotive tank fittings are of the same design. The Aeroquip tank fitting will shut off regardless of the type of fuel nozzle used. Manual systems are Dealer, Protectoseal and Wheaton.

Two years ago the Milwaukee applied water-cooled heads to Gardner-Denver air compressors to compare the conversion with the air-cooled and the completely water-cooled compressors. No compressor modifications are required to install water-cooled heads. Water jumpers are needed between the heads and the engine cooling-water system. Tests were made on a WXE compressor with two 7-in. dia. low-pressure cylinders and a WXO compressor with two 7⅞-in. dia. low-pressure cylinders.

Test results showed that compressed air temperatures in the WXO compressor with air-cooled heads would not stabilize at 50% load and in the air-cooled WXE compressor they would not level off at 100% load. With water-cooled heads both compressors performed satisfactorily.

New York Air Brake is developing a hydrostatic drive which will operate the air compressor at constant speed while diesel engine speeds vary from 275 to 835 rpm. When the main reservoir control valve is satisfied, the compressor is pneumatically unloaded and then stopped when the drive is disengaged. When air demand again calls for pumping, the compressor is brought from a standstill to full speed and then pneumatically loaded in less than 3 sec. H. N. Sudduth, NYAB, reported that one of these drives will be tested on a New York Central Alco unit having a 3CD compressor.

Static devices are gaining in popularity for locomotive aplications, the Committee on Electrical Equipment — Rolling Stock reported. Already under test are static voltage regulators, silicon diode reverse current relays and battery charging contactors, and thermistor control of battery charging. Considerable work is in progress to eliminate the main generator commutator and brushes. Smaller brushless d-c generators are already in use on passenger cars and operate satisfactorily.

Tie-Downs Being Standardized

Standardization of tie-down devices used on multi-level auto rack cars is being submitted for letter ballot. The specification covering tie-down tracks, winches, and chains has been completed by the Committee on Freight and Passenger Car Construction. The Committee has also recommended that multi-level rack cars be designated as "FA," removing them from the "FC" or conventional piggyback car designation which has previously covered them.

Other new car designations proposed are "XMLI" covering insulated box cars having loading devices; "RSTM" for bunker refrigerator cars similar to type "RSTC" but having meat rails, and "LM" for cars equipped with one or more tanks designed for pneumatic loading and unloading of dry, granular commodities, or non-dangerous low-viscosity liquids.

The AAR standard for RB type bunkerless insulated cars is to be changed to allow the use of improved types of insulation. Present standards specify the thickness. The Committee recommends that this be expressed in terms of thermal conductivity to permit the use of cellular plastics, and mineral and glass fibers for insulation. These materials would be the only ones permitted after Jan. 1, 1963, not only on RB cars, but on all types of refrigerator equipment. "The foamed-in-place and sandwich panel methods are superior; the continuous blanket method of insulat-

ing refrigerator cars is no longer the preferred method," the Committee reported.

A study of body bolsters for freight cars is being made. Designs of different builders and railroads have been compared. "The Pullman and ACF designs have been extensively tested, and it was the concensus that these two designs could be adopted as standards . . . Unless a suitable design of all-welded, built-up body bolster for 50-, 70-, and 100-ton cars can be completed, it may be necessary to consider the adoption of cast-steel underframe ends to be used on cars to be built in the future," the Committee said.

A freight-car truck with 38-in. wheels has been designed for high-capacity cars and probably will soon be submitted for letter ballot. This has been developed in cooperation with the Truck Manufacturers Engineering Committee which has also been cooperating in standardization of all truck side frames and bolsters. A Bessemer & Lake Erie representative said that his road had used 33-in. wheels under 95-ton cars for years without undue rail wear. High wheel loads have been found to damage rail.

Difficulty with the angle cocks on piggyback cars has resulted in testing of arrangements other than those in the AAR specification. "AAR requirements are not satisfactory for cars of other than conventional length and overhang; it is necessary for angle cocks to move with the coupler head," the Committee said. While a number of problems associated with 85-ft and 89-ft Trailer-Train cars have already been resolved, the matter is still under study by TTX, the Car Construction Committee, and the Committee on Couplers and Draft Gear.

Cushion underframes and hydraulic draft gears are matters of much interest to the Committee on Couplers and Draft Gears. Interchange car applications of the following devices have been authorized: Bendix Center-Sill Absorber (Bendix); Hydra-Buff Hydraulic Cushioning Device (A.O. Smith); Gliding Sill Hydraulic Cushion Underframe (National Castings), and Freight Master Hydraulic Draft Gear (Halliburton). Cardwell-Westinghouse has been authorized to sell 100 car sets of its tandem arrangement of conventional draft gears.

The Draft Gear Manufacturers' Engineering Committee reported on field observations of impact speeds in hump-yard and flat-yard switching. In 212 observations there were no impacts at speeds under 3.5 mph, only 2.3% under 4.5 mph, and 85.4% at speeds between 5.6 and 9.5 mph. The observations showed 5.2% of the impacts at speeds over 9.5 mph.

Brake-cylinder release valves are to be standardized, the Committee on Brakes and Brake Equipment reported. Revision of the cylinder release valve specifications, a letter-ballot item, would require standardization so that all existing and proposed valves, including adapter brackets, would be completely interchangeable.

In an effort to reduce brake system leakage on freight cars, the Committee has acted to make various changes in air brake components including the following:

- Recommend that the piston felt lubricator swab be removed during periodic COT&S maintenance because it is of little value with present cylinder lubrication and is a source of cylinder leakage and other cold-weather difficulties. The retainer ring would be left as a support for the packing cup.
- Investigate air hose, aimed at revising Specification M-601, with consideration of adhesives, outer covering, oil resistance and stronger fabrication.
- Recommend modification of the Interchange Rules to require use of the combined type dirt collector and cut-out cock with seal-ring key and the angle cock having seal ring key on all new and rebuilt cars after January 1, 1963, eliminating prime sources of brake-pipe leakage.
- Advise use of improved AB t cylinder packing cup with substanti duced operating friction at sub-zero te atures and satisfactory characteristi temperatures as high as 158 deg F. T warrants tentative approval. An imp compound for air-hose coupling ha developed and a small change in Spe tion M-602-59 to permit its use ha recommended as a letter-ballot item.

Testing has shown that cadmium p gives the best results as a corrosion i ing surface treatment for air-hose cou but would not withstand abrading a during coupling and uncoupling.

Regional Oiling Stations Studied

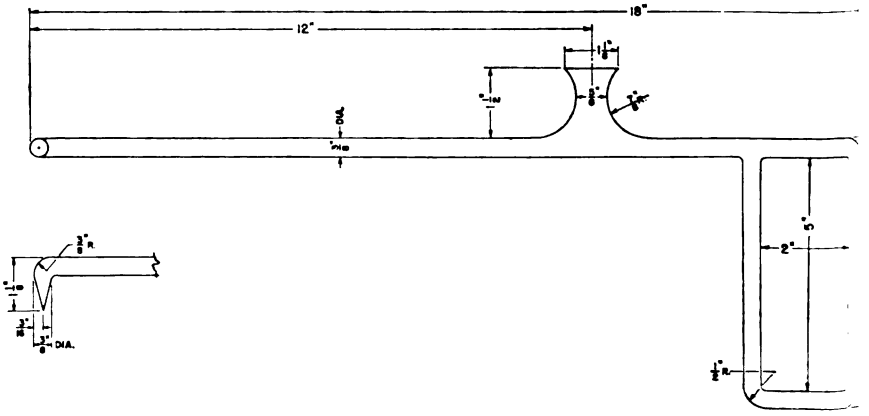
Recognizing that journal lubricators can operate for long distances without addition of oil to journal boxes, the Committee on Lubrication of Cars and Locomotives is studying the establishment of oiling stations at strategic locations where all freight cars would be oiled. These would be spotted so that cars moving in general interchange service would receive lubrication attention at approximately 1,000-mile intervals. Appointment of a subcommittee to study this problem followed the realization that some railroads were having hot boxes because lubricator-equipped cars were not being oiled often enough if they were destined to be interchanged with other lines. Member roads will soon be surveyed in an effort to establish proper geographic sites for such operations.

During the past year, the repack interval for lubricator-equipped cars was extended from 24 to 30 months after the Committee had completed experiments with some cars on a 36-month basis. After the inspection department had reported that lubricators were not being properly renovated at some locations, a more thorough renovation process has been detailed in Specification M-910A-62 and is being submitted for letter ballot. Some roads have had unsaturated renovated lubricators catch fire while stored in drums. No saturated lubricators are known to have done so, and the entire problem is being investigated. "When resaturated lubricators are allowed to cool before being packed in drums or stored in piles, they do not catch fire," the Committee reported.

As railroads are completing the equipping of all freight cars with lubricators, some have been interested in using lubricators on passenger cars. Difficulties developed with some such applications vices which perform satisfactorily freight equipment may not do so on senger cars. A subcommittee now stu this is expected ultimately to approve tain lubricators as suitable for passe car application. Another problem a as lubricator applications near 100 as repacking increases is the accuracy o reports made by member roads on number of applications of each type the accuracy of the cumulative figures by the Director of Mechanical Rese This is also under study.

The Committee has continued to give proval and to withdraw approval f journal lubricators. The next revisio the Interchange Rules will list 13 with C ditional Approval and 16 with Appr for Test status. A more rigid specifica for these devices has recently been proved.

"Journal stops secured within the h and contacting most of the journal le are still showing favorable results in longing the life of journal bearings, guards, rear seals, and lubricating de while reducing the number of hot bo the Committee commented. At least se designs were approved for limited in change testing during the year and an ditional five received authorization AAR laboratory testing. A standard cedure for testing such journal control vices has been approved for use by the search Center. The present specification dust guards, M-903, is under investiga because it is felt that devices which n not perform their intended functions ca manufactured under it.



Combination tool makes it unnecessary for car inspector to carry packing iron and hook.

atisfactory road tests of cars equipped
1 flat-back bearings and flat-back-bear-
wedges have led to the proposed letter
ot on making this design an AAR alter-
: standard. Because the so-called "non-
:rsible" wedges for use with flat-back
rings have been found applied in the
:rse position where they are more likely
:ause hot boxes than wedges which do
have this feature, approval of this de-
1 has been withdrawn. The Committee
authorized the application of 500 sets
aluminum solid journal bearings of the
design.

Because latest designs of plain cartridge
nal bearings have been operating satis-
orily on a 12-month lubrication basis, it
iow thought that they can operate for
iods longer than the 90 days specified in
:rchange Rule 66. "Considerable prog-
has been made during the past year in
dernizing the cartridge bearings in serv-
. . . which is expected to reflect in better
retention and which may make extended lubrication attention a possibility," it was reported.

Because some railroads may not feel it necessary that their car inspectors carry both a packing iron and a packing hook or waste-grab hook, a new tool which incorporates both a hook and box-lid opener has been developed. Letter ballot action is to be taken on including this in the Lubrication Manual. Because of the damage which roller, solid cartridge, and standard solid bearings may sustain if heavy welding currents are passed through them, a ballot is to be taken on including in the Lubrication Manual a provision that the welding ground connection should always be made on the part being welded—never on the axle, wheel, journal box, or rail.

A plastic journal-box lid with fusible discs to indicate excessive bearing temperature has been tested by a member road.

The lid functioned as designed in laboratory tests, and its inventor is now planning for its manufacture.

tandard Wheel Contour Proposed

Simplification of wheel standards involv-
sizes, tolerances, material specifica-
ns, and heat treatments has been pro-
sed by a subcommittee of the Commit-
on Wheels and Axles. For economical
eel life and maximum service, the "one-
ar" tread-and-flange contour, having
nge thickness of 1⅜-in. and rim width
$5\frac{23}{32}$-in., has been recommended for
wrought and cast steel freight car wheel
signs, including one-wear, two-wear and
ıltiple-wear types. Revised AAR Speci-
ations M-107 for all wrought-steel wheels
d M-208 for all cast-steel wheels are to
submitted for letter ballot action. Speci-
ations 103 covering one-wear wrought-
el wheels would become obsolete. Where-
er practical, the section numbers and
ırding of the proposed specifications for
ought and cast wheels have been made
: same.

Revised Specification M-107 covering all
pes of wrought-steel wheels would in-
:ase the maximum permissible carbon
r the untreated type from 0.77, present
aximum for the multiple-wear type, to
30 which is 0.05 lower than the 0.85
aximum in the present one-wear Speci-
ation M-103, which is to be made ob-
lete. The Committee believes the carbon
nge, less than present one-wear specifi-
tions allow, can be met by the manu-
cturers while the small increase in carbon
ıntent over the present multiple-wear
ecification should not affect wheel per-
ırmance. Classification of heat-treated
heels and the schedule for carbon ranges
ıd Brinell hardnesses in the proposed
ıecification are the same as those in the
:esent Specification M-107.

Proposed Specification M-208 for all
ast-steel wheels, A and B types, follows
resent Specification M-208 for untreated
'heels. Because of the large difference in
arbon content of the Type A and Type B
'heels, a separate chemical composition is
pecified for each. Maximum carbon for
ıe untreated Type A wheels has been re-
uced by 0.05 from the present 0.85 to
ıake it the same as that of wrought-steel wheels. Other chemical constituents are the same as at present. Carbon content of Type B wheels and other elements remain the same as in the present specification. Because the carbon and manganese proportions in the B wheels are so much different, there was no advantage in change.

Classification for heat-treated Type A wheels and the schedule of carbon ranges and Brinell hardnesses in the proposed Specification M-208 are those presently given in Specification M-107 for multiple-wear wrought-steel wheels. At present, the value of the carbon content of the production Type B wheels is not considered satisfactory for heat treatment in line with experience with wrought-steel wheels. The same heat treatment schedule has been shown for the Type B as for the Type A wheels. To comply with the heat treatment schedule, the range of carbon will have to be that of the same treated class of wrought-steel wheels.

Revisions in nominal hub diameters and tolerances of the Type A and B cast-steel wheels have been made to reduce the number of design identifications. On the AAR design drawings, the sketch of the wheel is provided to indicate location of required dimensions of the rim, flange and hub and does not represent the production shape or dimensions of other portions of the wheel. This change in hub sizes and tolerances allows use of the same design identification for a given size cast-steel wheel of either the A or B type.

The Committee has recommended that 17 designs of 28-in., 33-in., and 36-in. wrought- and cast-steel wheels for freight cars be presented for letter ballot as AAR standards. The designs for Types A and B cast-steel wheels would include revised hub dimensions and hub tolerances so one dimension will apply to both. Recommended for all the proposed standard designs is the one-wear 1⅜-in. flange (measured ⅝-in. above the base line) along with all the dimensional tolerances associated with the present one-wear flange.

The Committee recommends for further study a modification of the present steel wheel gage to determine the amount of tread metal which must be removed to restore the 1⅜-in. flange when the tread metal remaining justifies such a flange on those wheels manufactured with it. Also to be studied would be restoration of the 1⅜-in. flange on wheels made with this flange to develop whether it should be maintained when turning two-wear and multiple-wear wheels; what the minimum remaining rim thickness would be that would justify restoring a full 1⅜-in. flange; what remaining rim thickness would justify $1\frac{5}{32}$-in. flange, and whether there could be a compromise flange thickness for remaining tread thickness to achieve maximum wheel service. Acceptable identification methods should be developed for wheels having 1⅜ in. flanges when mounted to make service metal charges and credit in interchange billing, and information in paragraphs 2D.28 and 2D.29 of the Wheel and Axle Manual should be revised to include turning procedure to best conserve service metal in steel wheels manufactured with 1⅜-in. flange when such wheels require turning.

If the 1⅜-in. flange for freight car wheels is adopted, the Committee recommended development of procedures for handling them in interchange while pricing and turning studies are made. As an interim measure, the Committee has recommended that charges and credits for service metal on two-wear and multiple-wear wheels with the 1⅜-in. flanges be on the basis of restoring $1\frac{5}{32}$-in. flange.

Interchange Rules affected if the proposed wheel designs are advanced to standard include Rule 10-b-1 which would have

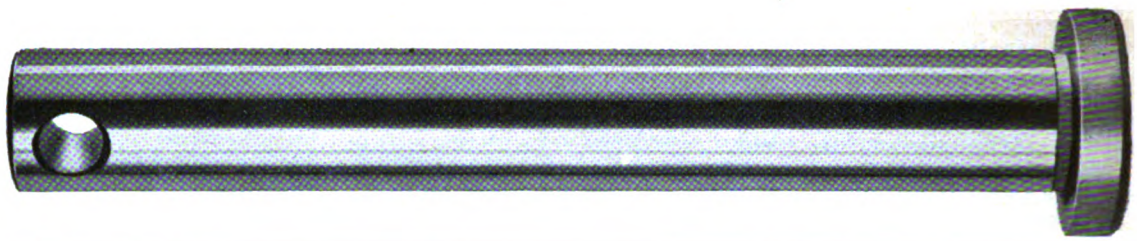
Proposed Standard Wheels for Freight Service

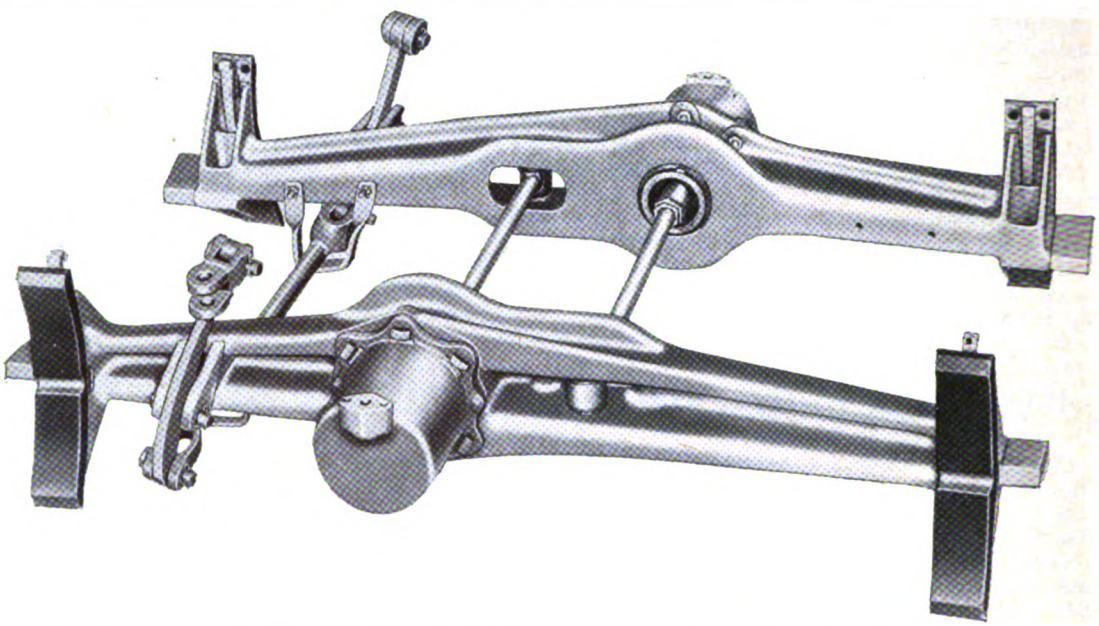
AAR Identification Proposed	Present	Tread*	Maximum axle size
	Wrought Steel		
B-28†	X14	1W	6 x 11 RS
N-33	-------	MW	5½ x 10
P-33	-------	MW	6 x 11
R-33‡	-------	MW	6 x 11 RS
H-36	X15	1W	6½ x 12 RS
J-36	X16	2W	6½ x 12 RS
K-36	X17	MW	6½ x 12 RS
	Cast Steel		
CB-28†	X8, X10	1W	6 x 11 RS
CK-33	X5, X6	2W	5½ x 10
CL-33	X5, X6	2W	6 x 11
CM-33‡	X5, X6	2W	6 x 11 RS
CN-33	-------	MW	5½ x 10
CP-33	-------	MW	6 x 11
CR-33‡	-------	MW	6 x 11 RS
CH-36	X11	1W	6½ x 12 RS
CJ-36	X12	2W	6½ x 12 RS
CK-36	X13	MW	6½ x 12 RS

*RS Raised Wheel seat
1W One Wear
2W Two Wear
MW Multiple Wear

†Rail load limit 22,400 lb per wheel because of diameter.

‡Wheel with maximum hub is intended for cars with maximum capacity of 70 tons.





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Railroad Division

EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

: revised to allow use of 36-in. one-wear two-wear wheels in cars of greater than on capacity because it is worded to ict the use of certain 33-in. wheels, and : 10-f-3 which would have to allow cast- wheels the same status as other wheels e design is advanced to standard.

Designs

he Committee will permit the manufac- of 7,000 car sets of 36-in. one-wear, wear and multiple-wear wrought-steel els and 2,000 car sets of 28-in. one-wear ught-steel wheels for use on cars in gen- interchange service. All will have the -wear tread and flange contour. Al- igh all of these types are included in the designs submitted for letter ballot action, they are placed on an experimental status to permit their use until made standard. Provisions are to be included in the Interchange Rules to cover them, prohibiting any penalty for substitution of either one-wear wrought-steel or one-wear cast-steel wheels. When these wheels are removed from service, the handling line should notify the car owner and obtain disposition. During the experimental period, charges and credits should be on the same basis as those for one-wear wrought steel wheels.

The Committee has also recommended for letter ballot that there be a chamfer on ends of journal roller bearing axles in place of the reduced diameter with its sharp corner which is the present standard.

terchange Rules To Be Revised

lumerous changes have been recom- ided for the present Interchange Rules he Arbitration Committee and the Com- tee on Prices for Labor and Materials. s probable that the next revision, due gust 1, will incorporate most of these nges. Principal changes are described ow, identified by rule number, section, l paragraph, in that order, unless other- e indicated.

Rule 1-a-2. To provide for close inspec- n of all empty cars for defects which ght subsequently require transfer of lad- ; a new paragraph is added: "All empty s must be thoroughly inspected for de- tive body bolsters, side bearings, sills, ds, sides, doors, etc., that could cause nsfer of lading. Arrangements must be ade to repair such system cars and for- rd foreign cars home for repairs."

Rule 2-g-8, 9, and 10. Addition of three ragraphs covering defect items for which nsfer authority will not be issued because : receiving road can make at least tem- rary repairs while the car is under load. .cept when car is loaded with flammable aterials, explosives, cotton, or other dan- rous articles, the car components to be re- ired are cracked or broken side sills, icked or broken body bolsters between e side bearings and side sills, and exterior le posts or side braces.

Rule 2-g-2. Addition of new paragraph establish uniform, fair, and reasonable ndards for decisions relating to the trans- r of lading from cars at interchange points ther than repairing defective cars while der load, also to provide for handling of estionable cases by the Arbitration Com- ittee.

Rule 2-g-3 and 4. Addition of new third d fourth paragraph to insure that cars hich have defects which justify transfer of ding will receive permanent repairs before ain being loaded. Under present rule it s been found that cars have sometimes d different loads transferred from them ecause the same defects have gone unre- ired after each unloading.

Rule 2-j. Modification to allow foreign- ne bad-order cars to be unloaded within a witching district and returned to owner.

Rule 3-a-8, 9, 10, 11, and 12. Addition f new paragraph 8 requiring seal ring key n angle cocks of all new or rebuilt cars fter January 1, 1963, renumbering present paragraph 8 to 9; addition of new paragraph 10 requiring combined type dirt collector and cut-out cocks on all new or rebuilt cars after January 1, 1963; renumbering of present paragraphs 9 and 10 to 11 and 12. All changes recommended by Committee on Brakes and Brake Equipment.

Rule 3-a-9. Modification allows former alternate standard tubular type to be used until Jan. 1, 1964, when such axles will be prohibited in interchange. New note says tubular axles may be removed at expense of owner at the time of periodic lubrication, or when cars are on repair track for renewal of one or more pairs of wheels. Similar changes made in Rule 66. Changes made because reduced incidence of journal overheating generally, which affects tubular axle strength particularly, means that loaded cars need no longer be shopped for removal of tubular axles.

Rule 3-c-3. Addition of new paragraph requiring AAR standard, alternate standard, or approved coupler yokes on all new or rebuilt cars after January 1, 1963. Recommended by Committee on Couplers and Draft Gears.

Rule 3-j-3. Modification to eliminate effective date of May 1, 1962, because all cars are now to be equipped with journal lubricators.

Rule 3-s-11. Addition of new paragraph requiring stenciling of height and width of door opening on all box cars built new or repainted after January 1, 1963. Will apply to all box cars in interchange on January 1, 1968. Recommended by Committee on Freight and Passenger Cars and approved by letter ballot.

Rule 3—Interpretation 2. Modification is recommended to clarify the intent and separate the conditions in Rule 3 which justify transfer of lading by the receiving road from those which do not justify such action.

Rule 9—Item 5. Addition of new seventh paragraph indicating that journal lubricator considered standard for car can be stenciled on side to justify repacking regardless of date.

Rule 10. Modification of entire rule to incorporate the references and requirements for standard full-flange contour on multiple-wear wrought-steel wheels and to include all provisions and interpretations in Rule 98 which will be eliminated.

Rule 11-a. Modification to read: "In the event new wheels are applied, for which owners are charged," so that the owner will be protected when steel wheels are applied in place of cast-iron and then are shortly removed because of handling-line responsibility.

Rule 17-1-3. New third paragraph added to require that both angle cocks and combined dirt-collector and cut-out cocks used as replacements after Jan. 1, 1963, must have seal ring keys.

Rule 17-c-2. Addition of new note requiring that E-60 Grade B and E-60-HT Grade C couplers must not be substituted for B-E-60A-HT type. Recommended by Committee on Couplers and Draft Gears.

Rule 17-c-9 and 10. Present paragraph 10 be renumbered 9 and present paragraph 9 be eliminated because riveted coupler yokes are no longer permitted in interchange.

Rule 17-r. Modification to require use of approved perforated-type brake steps on hopper and drop-bottom gondola cars.

Rule 17-t-4. Modification to indicate that lubricators from which approval has been withdrawn must not be used and are to be removed and scrapped at any time at owner's expense.

Rule 17—Interpretation M-11. New interpretation classifying as wrong repairs the application of 2¼-in. followers with Mark 40 draft gears because this type requires followers with ½-in. offset to attain the full capacity at 3¼ in. travel.

Rule 19—Items 32 and 33. List of materials not to be used in making repairs to interchange freight cars expanded to cover waste journal-box packing and riveted-type coupler yokes.

Rule 23-a-7. New note specifies that bolsters, side frames, and couplers of Grade B steel may be charged in a furnace with an initial temperature of 1,675 deg or less for annealing. Recommended by Committee on Freight and Passenger Cars.

Rule 30-E. Modification of section allows light weighing of freight cars in motion and coupled together on a properly designed track scale.

Rule 32—Paragraphs 1 and 2. Present paragraph 2 renumbered "1-A." New paragraph fixes delivering line responsibility for caps or covers missing from bottom connection openings on pneumatic or vacuum unloading devices of covered hopper cars.

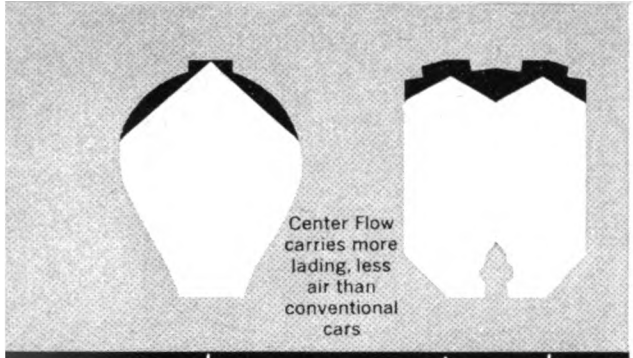
Rule 32-10-k. Modification of second note, seventh paragraph, to cover COT&S of air brakes, repacking of journal boxes, and light weighing of cars made necessary because stenciling has been rendered illegible by open flames or other heating devices used to facilitate unloading.

Rule 60-m-2, 3, 4, and 5. Modification changing 60-day period originally established for type K air brakes to six months justified with today's Type AB equipment. Recommended by the Committee on Brakes and Brake Equipment.

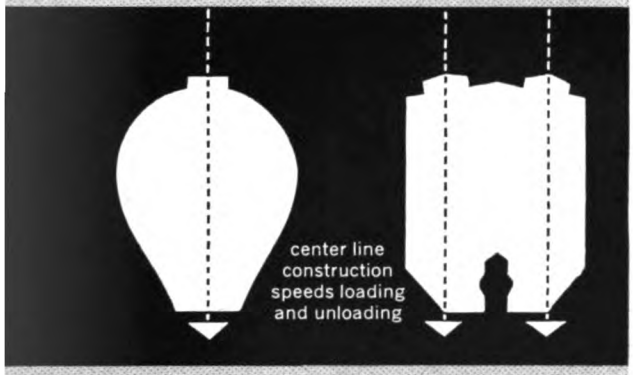
Rule 65-a. Modification to indicate that lubricating devices from which approval has been withdrawn are to be scrapped at expense of car owner any time they are removed from boxes.

Rule 66-a-6, 7, 8, 9, 10, and 11. Paragraph 6 modified to separate the devices from which approval has been withdrawn

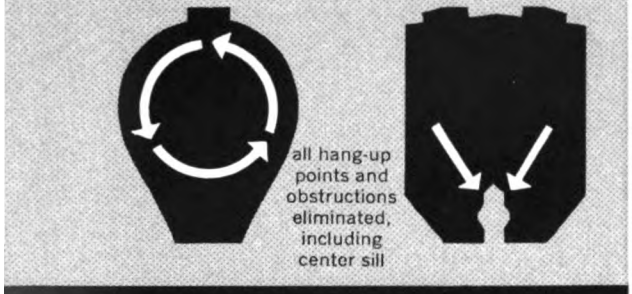
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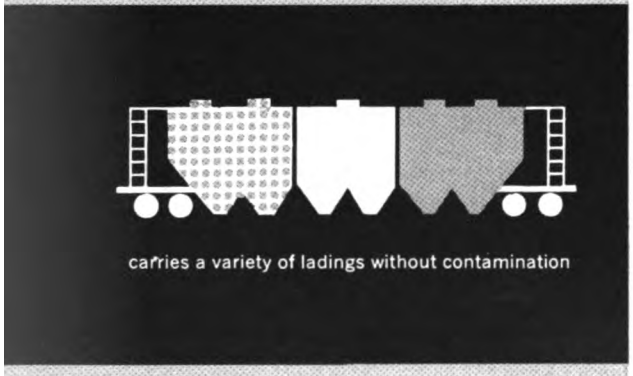
Center Flow carries more lading, less air than conventional cars



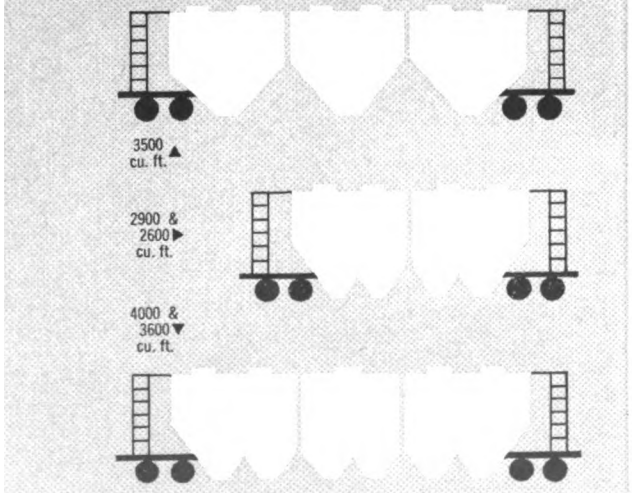
center line construction speeds loading and unloading



all hang-up points and obstructions eliminated, including center sill



carries a variety of ladings without contamination



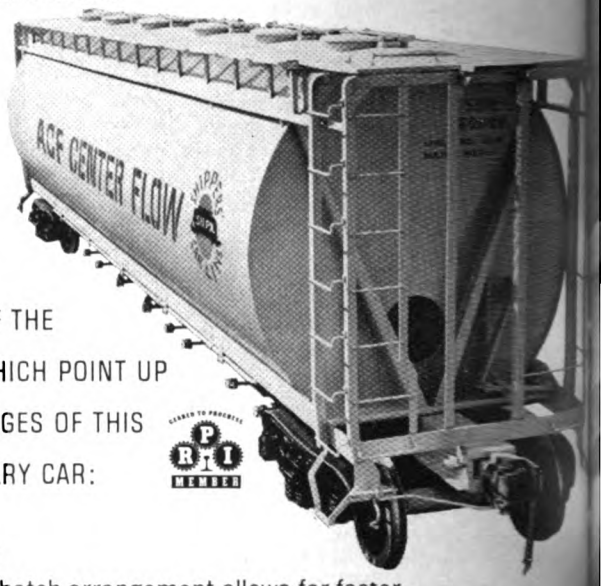
modular construction permits Center Flow to be manufactured in different capacities.

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BULK MATERIAL CAR LOADS AND UNLOADS FASTER, CLEANER, EASIER

ACF's new Center Flow can carry a wide variety of ladings, including plastic pellets, chemicals and foods such as flour, malt and other grains. Its clean interior, free from sharp angles and ledges, speeds loading and also facilitates quick discharge with either gravity or pneumatic outlet. The Center Flow's design versatility enables it to be manufactured in different capacities to provide the most economical transport of commodities of varying density. A further design advantage lies in the fact that the number of unloading hookups can be tailored to meet individual requirements.



FOLLOWING ARE SOME OF THE FEATURES WHICH POINT UP THE ADVANTAGES OF THIS REVOLUTIONARY CAR:

LOADING

- Center line hatch arrangement allows for faster, easier loading.
- Light weight increases payload.
- More effective use of cubage.

UNLOADING

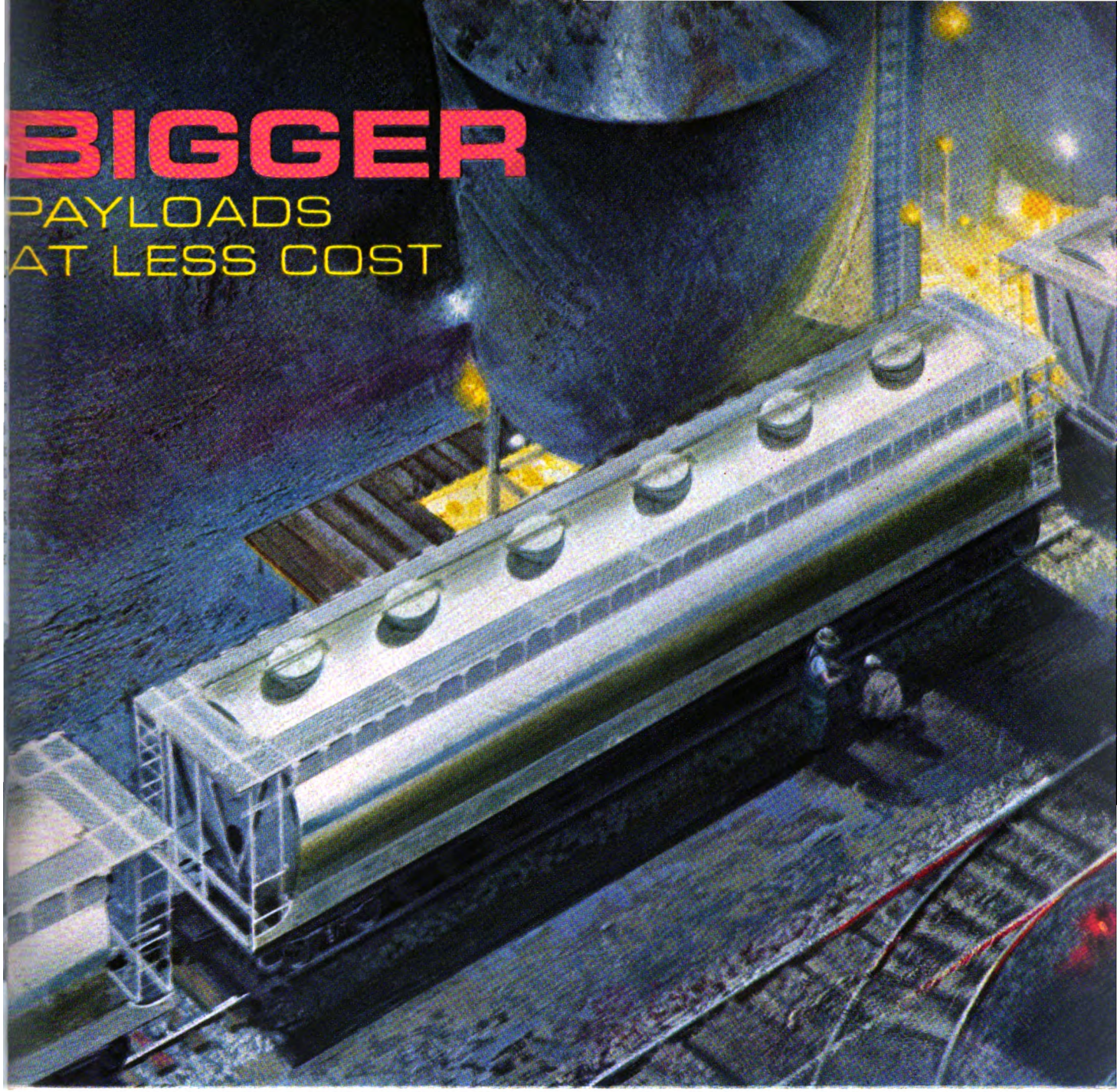
- Center line unloading.
- 50° slope angle allows faster unloading.
- Either pneumatic or gravity outlet.
- Single or double outlet per compartment as desired.

CONSTRUCTION

- Manufactured in aluminum or steel.
- Fewer hatches.
- Elimination of center sill.
- Elimination of side stakes, and carlines.
- Lower center of gravity.

CONTAMINATION-FREE

- Ease in lining preparation.
- "Clean Bore" design—self cleaning.
- Easier clean-out or flush-out.
- Individual compartments.
- Gasketed hatches with screw-down covers when required.



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(Continued from page 29)

and those approved for use. Paragraph 7 modified to exclude devices from which approval has been withdrawn. They are included in new paragraph 8. Present paragraph 8 renumbered 9. Paragraph 10 added to indicate the type of lubricator which will be considered standard for the car. New paragraph 11 added covering the change of wheels or other repair work done on the road when boxes are not repacked so that billing exceptions may be later avoided. All paragraphs also provide for repacking of car at any time if car is stenciled for lubricators from which approval has been withdrawn, or if it bears no stenciling.

Rule 66-b-5. Modification to provide charge against car owner any time when devices from which approval has been withdrawn are taken from car.

Rule 86—Paragraph 2. Modification of paragraph to indicate that cars must not be loaded in excess of weights shown in table, that stenciled load limit must not be exceeded, and that load limit will not apply when car weight must be restricted to comply with AAR loading rules. All these are to prevent indiscriminate loading of four-axle freight cars beyond new 5% higher load limits which are: 30-ton cars—103,000 lb; 40-ton cars—142,000 lb; 50-ton cars—177,000 lb; 70-ton cars—220,000 lb, and 100-ton cars—263,000 lb.

Rules 91, 92, 93, 94, 96 and 100. All rules, notes, and interpretations be modified or deleted to make possible data processing machine billing as an alternate method.

Rule 96—Paragraph 6. Modification to permit group billing for combinations of items applied to the same car when not renewed in connection with other repairs which cannot be covered by group billing.

Rule 101. Material and labor charges have been revised to reflect increased costs; several material lists revised to simplify billing procedures or to show present status of parts involved.

Passenger Car Rule 2-n. Addition of new section prohibiting use of Class C wrought-steel wheels in passenger-train cars equipped with tread brakes.

TOFC Rule 14. Modification to add as reasons for refusing to accept in interchange "trailer with defective mechanical refrigeration unit or having improper lading temperature," conforming with Rule 58.

TOFC Rule 61. Modification to provide that only repairs costing more than $50, not including fuel, may be billed against owner, so that handling carrier will absorb higher percentage of heating and refrigeration equipment maintenance.

TOFC Rule 82—Paragraph i. Modification with "ordinary wear and tear" altered to read "deterioriation due to corrosion or decay."

TOFC Rule 86. Modification to indicate "handling carrier's maintenance program."

TOFC Rule 90. New rule added to indicate tire and tube maintenance and repair is the responsibility of handling carrier.

TOFC Rules 97, 98, and 157. Modification to raise $50 limit to $150 because the former limit has been found too low, complicating the proper handling of repairs.

TOFC Rule 172. Modifications to indicate that empty weight and height should be stenciled in 2-in. letters, preferably on left side near front end of trailer.

Roller Bearing Installations Up

Of 30,714 new cars built during 1961, 17,770 or 57.8% were equipped with roller bearings, the Committee on Journal Roller Bearings reported. There were roller bearings on 117,686 interchange freight cars on April 1, 1962. At the end of 1958, 45,965 cars were equipped.

Failures of AAR alternate standard pedestal side frames at the junction of the outer pedestal leg with the top of the frame were investigated by the Truck Manufacturers' Engineering Committee. The possibility of fractures occurring because of either static ar fatigue loading has been eliminated. Severe end impact has been the prime cause of the pedestal leg fractures, particularly when ambient temperatures are low. The TMEC increased the radius in the upper outside corner from ⅜ in to ⅝ in. and increased the metal thickness in this area from ⅝ in. to ¾ in. The rib above the pedestal opening was extended toward the end of side frame. Effects of overloading freight cars with roller bearings has been studied for the Committee by the Roller Bearing Manufacturers' Engineering Committee. Life of bearings in the study is based on full spring suspension system in good operating condition. It indicates that a 5% increase in the standard AAR axle ratings will reduce expected bearing life by 15%. A 25% increase in AAR axle ratings would reduce the life 50%.

The Committee has authorized Brenco to supply a total of 2,600 car sets of journal roller bearings for application to freight cars in interchange. These include 1,000 authorized during the latter part of 1961, and an additional 1,000 early this year. Federal-Mogul-Bower has been authorized to sell 100 car sets of 6 x 11 journal roller bearings for interchange freight car applications.

Application of roller bearings to integral-journal-box truck side frames will be permitted if the frames are not over 25 years old. This recommendation will be submitted for letter ballot. Such side frames are to be stenciled with steel dies showing date of modification. A new location of heat indicator holes in the narrow pedestal adapters for side frames will minimize the possibility of breakage.

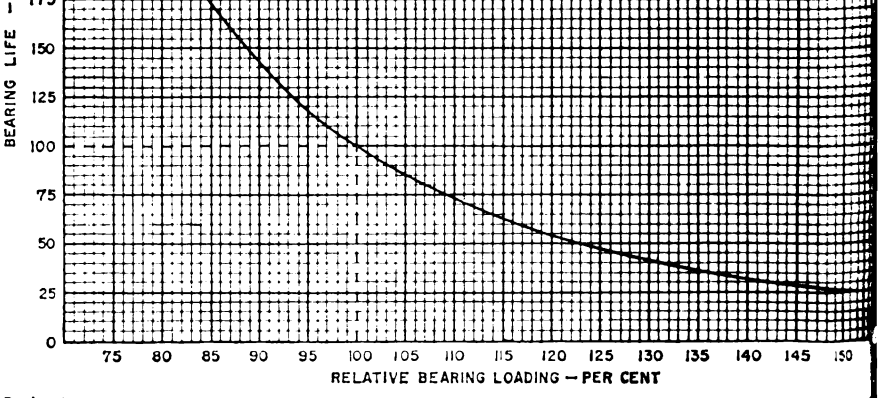
Difficulties with seals and seal perfe ance on present day roller bearings was cussed with the RBMEC. The RBMEC ported that the seals are the best that ma facturer can at present produce. Th seals are made to rigid specifications subjected to constant inspections. A m rigid specification would make it impos to produce sufficient quantities of seal meet requirements, RBMEC reported. seal manufacturers and bearing manu turers are constantly working toward be seal design and to obtain better mater for present seals.

The Committee requested the RBM to furnish a tolerance on bent roller bea axles and were advised that the allowa tolerance should be 0.005-in. full dial dicator reading measured at the dust gu seat when the axle is swung on good cent This location was selected because all r bearing axles do not have body finish tween wheel seats.

Heating of roller bearing inner races application was referred to the Commit on Wheels and Axles for revision of Wheel and Axle Manual. Maximum t peratures should be 300 deg F., apply only to races. When rollers and cages permanently assembled with races must not be heated.

RBMEC has produced a drawing co ing all approved side-frame keys used standard and alternate standard pedes type side frames. Shown are the differ designs of keys, the side frames to wh they are applicable, and the type and sign of roller bearing with which the should be used.

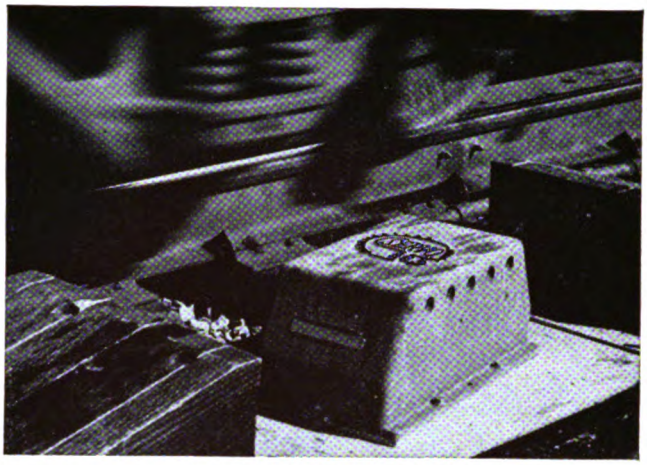
The Committee has revised the A Specifications for Approved Roller Bearin Applicable to Interchange Freight Cars provide that bearings and enclosures sho be designed for periodic grease lubricati at three-year intervals and the amount lubricant to be added at these inter should be the same for corresponding si of bearings made by all manufactur Manufacturers are not permitted to p their roller bearing units with greases wh are not listed in Interchange Rule 66 when they are delivered for application cars which will operate in interchange.



Reduction in roller-bearing service life could be expected if cars were continuously overloade AAR action raising all car-load limits resulted in study by roller-bearing manufacturers.

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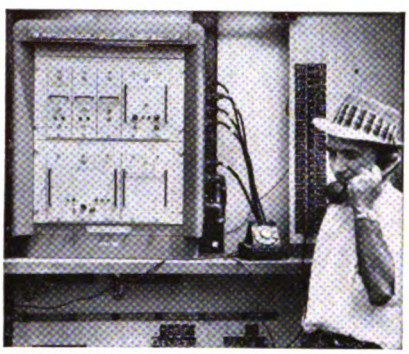




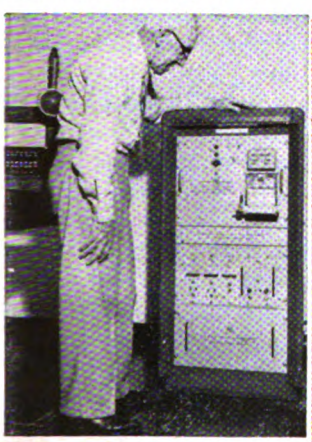
SCANNERS: Located beside the track, sensing elements "look" at the infrared heat radiation of passing journals.



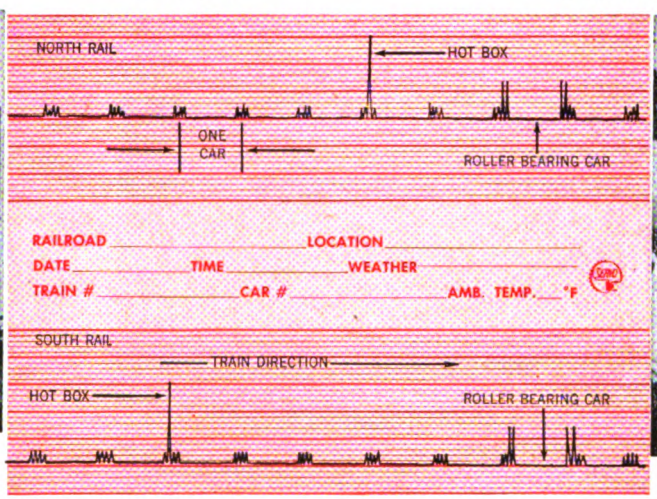
TRANSDUCERS: These electronic "wheel pick-ups" control the scanners' view to suit train speed.



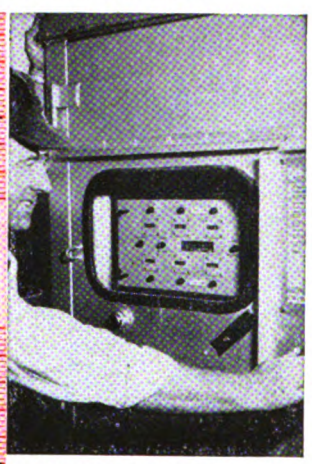
ELECTRONIC COMPONENTS: Housed in a wayside signal case, these units process data from the scanning elements.



RECORDER: Located at trackside, in a remote yard, or dispatcher's office, this unit records the relative heat of each moving journal.



RECORDER CHART: This record of relative heat of journals locates trouble spots for service before they cause damage or derailment.

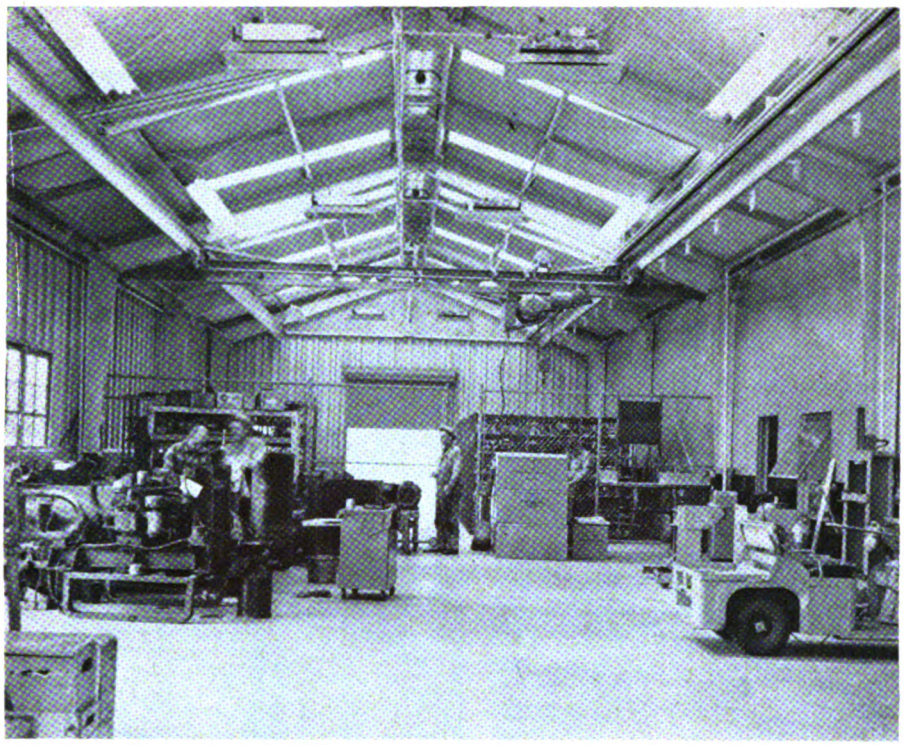


HOT BOX LOCATOR: This accessory makes an electronic wheel-count for error-free location of overheated journals.

The SERVOSAFE® Hot Box Detective* System is proved in use throughout the U.S.A. and abroad. It quickly pays for itself by preventing derailments, damaged journals, lost train time, and spoiled cargo. When installed at recommended intervals, the SERVOSAFE System virtually eliminates journal burnoffs and derailments caused by bearing failures.—■—The basic SERVOSAFE System can be furnished with SERVOLARM® automatic alarm to tie in with existing signal equipment and with SERVOSIG® Carrier for remote data handling and transmission over standard communications media. Major Class I railroads operating more than half of the total rail mileage in the U.S.A. now use SERVOSAFE Hot Box Detective Systems and new installations are continually being made as part of a general industry effort to reduce operating costs. ■—You are invited to write for detailed technical literature. Inquiries will be handled promptly by our group of hot box specialists.

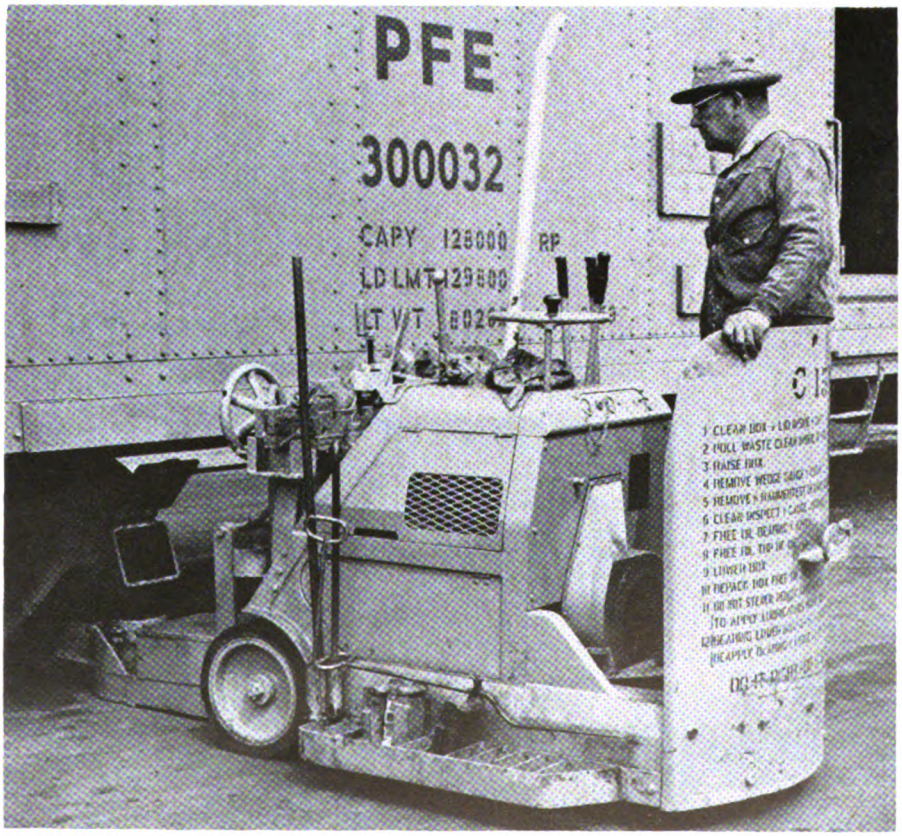
RAILROAD PRODUCTS DIVISION
SERVO CORPORATION OF AMERICA
111 New South Road • Hicksville, L. I., N. Y., U.S.A.

**Protected by U.S. and Foreign Patents, including U.S. Patents No. 2,880,309, No. 2,947,857, and No. 2,963,575.*



Mechanical refrigeration shop is equipped to repair engines, compressors, and other parts.

PFE Moves to New Reefer Repair Facility



Mobile journal brasser is one of mechanized units used in repair yard. Brasser has hydraulic jack and trimmer to speed the bearing replacement and overhaul operations.

Latest step in the program of the Pacific Fruit Express to fit its maintenance facilities to changing traffic patterns has been the opening of a $1½ million car repair and servicing facility at City of Industry, just outside the Los Angeles city limits. Occupying 2[illegible] acres and with over 3 miles of track, this installation is daily making light running repairs on 100 to 125 cars and heavy running repairs on 14 cars.

Involved are all types of PFE refrigerator cars, including those with mechanical refrigeration equipment and others with Ice-Tempco systems in which fans powered by diesel-driven generators circulate air through the ice bunkers. The facility can repair the diesel engines, generators, and refrigeration equipment on mechanical cars as well as make repairs to carbodies and running gear of all PFE equipment.

Opening of the City of Industry repair station has enabled PFE to close its general shop at the Southern Pacific's Taylor Yard in Los Angeles. The new facility, opened February 1, receives refrigerator cars from the Southern Pacific, Pacific Electric, and Union Pacific for repairs, servicing and cleaning prior to their being forwarded to loading stations. In addition, PFE piggyback trailers are handled at this shop. Forces operating from the City of Industry facility also service mechanical refrigerator cars and trailers requiring attention at outlying points. The basic shop operations are on a daily one-shift basis.

Work is performed on three of the tracks—two assigned for light running maintenance, and the third for heavy running maintenance. There are six tracks through the facility, with the other three being used for car storage. A paved working area with a length of 2,860 ft surrounds the three shop tracks.

On the track assigned for heavy running maintenance, repairs requiring up to about three days are made on all types of cars.

Work is that which cannot be done in the light running maintenance yard and includes replacement of wheel sets, center plates, and draft gears, and the repairing of car interiors. In general, the spot system is used for steel work and the progressive system for carpenter work.

The track is equipped with air and water outlets, and with electric power connections for welding machines and

(Continued on page 37)



DESIGNED TO MEET YOUR SPECIFICATIONS

SCULLIN DRAFT SILL CASTINGS

Working in close co-operation with the mechanical departments of leading railroads, Scullin was a pioneer in the development of one-piece Draft Sill Castings. They combine the striker, draft gear pocket, center filler and center plate into a single, rugged unit of great strength. They are available for all types of cars, including high capacity 90-ton hopper cars — and can be furnished with integral body bolsters.

Draft Sill Castings are another development by Scullin — for over 60 years, one of America's most reliable manufacturers of highest quality Freight Car Side Frames and Bolsters.

Whatever **your** requirements, Scullin production schedules are set up to assure fast delivery, on time, whatever the quantity involved. Specify Scullin Steel Castings for your new or rebuilt cars.

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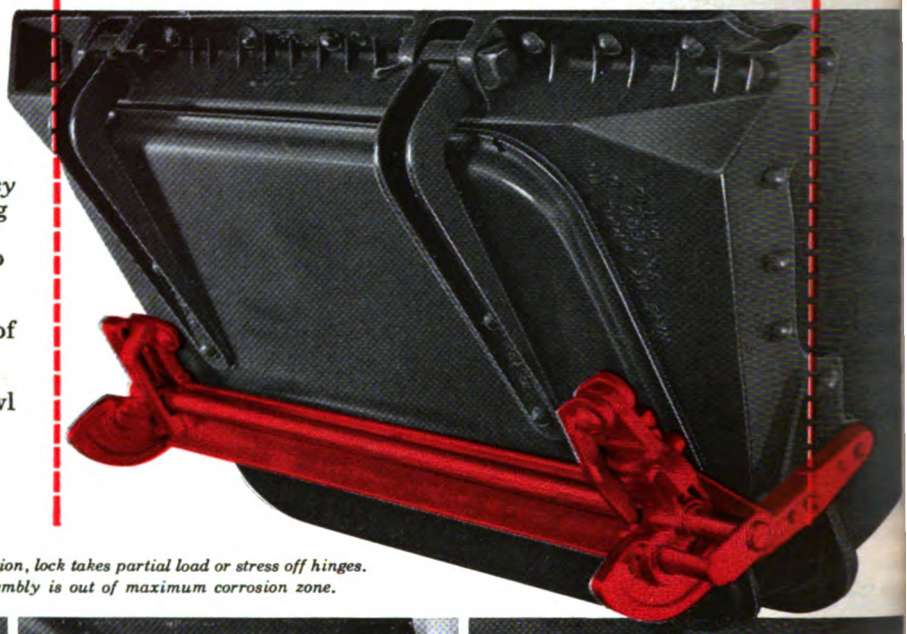
RPI MEMBER



NEW

EXCLUSIVE
CAM ACTION LOCK *

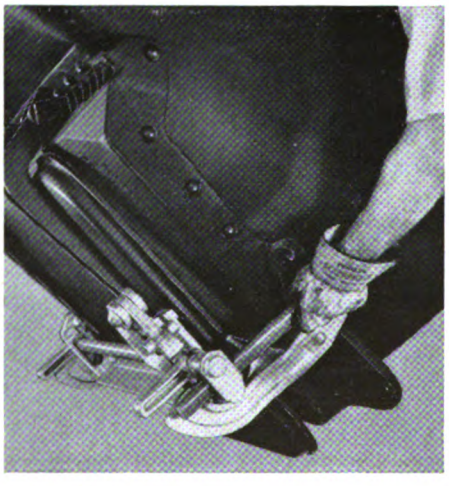
FULL WIDTH
SINGLE HOPPER DOOR LOCK



For the car builder, this new lock means *lower* installation costs. For the operator it means *safe, sure* and *fast* operation. The exclusive cam action makes operation *extra easy* and provides *reserve* power for pulling the door up tight. Comes ready to install—only nine rivets required. No extra materials. No extra expenses. Each part is built to a fixture to assure an accurate fit. Unit consists of inside and outside hooks plus door member assembly: shaft, reinforcing angle, cams, bearings, pawls and pawl brackets. We'd be pleased to demonstrate *all* the advantages of this new lock. See your Wine representative or write us for more information.

In closed position, lock takes partial load or stress off hinges. Door lock assembly is out of maximum corrosion zone.









Door in final locking stage. Cam on each side goes to dead center for positive locking action. Operating head near outside of car. *Inset:* Locking pawl serves as safeguard . . . door *stays* locked.

Initial opening is safety step requiring approximate 90° turn. Door opens *part* way. This step suitable for discharging fine materials or where conveyor system is inadequate for full discharge.

Further rotation of bar disengages hooks so door swings freely on hinges. Swinging door after car is empty returns it to safety position and use of bar through cam brings door to final locked location.

* PATENT PENDING

WINE RAILWAY APPLIANCES

THE WINE RAILWAY APPLIANCE CO.
DIVISION OF UNITCAST CORPORATION • TOLEDO 9, OHIO

ıer electrical tools. Material charge- t stations are strategically placed at : various repair spots. Welding uipment assigned to this track in- ıdes two welding tractors, four sta- nary welding machines, and three rtable welding and cutting units.

On the two light running maintenance tracks cars are cleaned and serv- :d, and receive light repairs. Each ght all completed cars are switched t of the shop tracks and sent to load- g areas. The light running maintenance tracks are immediately filled th cars due for servicing and repairs.

Work starts at 5 a.m. when one man ts flags on the tracks and starts in- ection of mechanical refrigeration uipment. This pactice was instituted expedite the testing and repair of echanical refrigerator cars. At 6:30 n., additional repair and stores per- nnel go on duty. Car doors and tches are opened, floor racks are ised, and removal of rubbish and ınnage is started. At the same time, spection and classification of cars ts under way.

nop Operation

The major portion of the shop force gins work at 7:00 a.m. Repairs are en made to items listed by the inspec- rs. These repairs are made on a pro- essive basis. Repairs and servicing running gear, underframes, super- ructures and interiors can all be han- ed on the light running maintenance acks. Journal boxes are oiled, re- acked, and rebrassed. Special atten- on is given to the cleaning and wash- g of car interiors—floors, floor pans, id floor racks. Both tracks are uipped with water hoses and air out- ts, spaced at 100-ft intervals. Be- re the car is released for service, a pervisor and qualified inspector ieck to see that all work has been mpleted. Cars inspected and found require more extensive repairs than ın readily be made on the light run- ng maintenance tracks are tagged ıd listed for switching to the heavy ınning maintenance track.

A stores department Pakmor truck used for handling the rubbish and ınnage removed from cars. This uck is equipped with a barrel-type ontainer and chain-drive equipment compress debris, allowing heavier ads to be moved. The stores depart- ent also operates a material train onsisting of six trailers and one trac- r which travels to the various repair



Six-unit train of trailers has speeded distribution of car repair materials in yard.

sites. Some trailers are equipped with special racks and Rotabin units to speed the dispensing of small parts. Heavy items are carried on flat trailers in palletized lots.

Two mobile welding tractors, equipped with welding generators, oxygen and acetylene tanks and cutting equipment, are utilized in making car repairs. Two car department trucks, equipped with tool and parts lockers, are used by men assigned to the repair of direct-drive and electrically driven fans on ice-cooled cars. Employees handling this work make repairs to cars on a progressive basis. Two similar units are used for testing, repairing, and servicing air-brake equipment. Journal maintenance is handled with a mobile brasser equipped with a hydraulic jack and brass trimmer.

Eight battery-operated personnel carriers are utilized for work on mechanical-refrigeration equipment and temperature-control devices. These units, with all tools and test equipment, work throughout the shop area.

One battery-operated carrier is used by the supervisor in charge of mechanical-refrigerator-car repairs, and a similar unit by the supervisor in charge of light running repairs on standard refrigerator cars. Studies are being made of additional automotive equipment to facilitate various operations in the repair yard.

Other material-handling equipment, operated by the stores department, includes six fork-lift trucks of varying capacities, one heavy-duty tractor for moving and switching cars, and two highway trucks. The car department utilizes a panel truck and a step-van truck especially equipped for making repairs to mechanical refrigeration equipment in cars and piggyback trailers at loading and unloading stations, and at piggyback ramps.

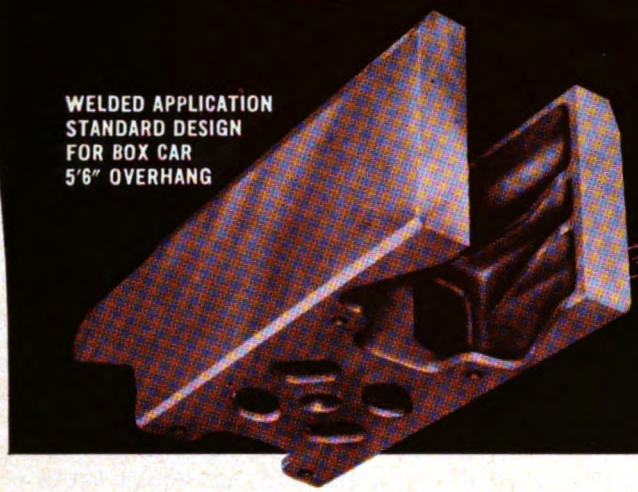
Mobile equipment operated by stores forces is radio-equipped and is dispatched and controlled from the main office building. Car department supervisors have "handie-talkie" radios which save much time in getting men, materials, and equipment to repair spots promptly. The panel truck has mobile radio so that, day or night, it can be contacted and dispatched to outside points to make emergency repairs to mechanical refrigerator cars and piggyback trailers.

Six Tracks

The six tracks in the shop area are numbered from the south: No. 1—run-around tracks used for switching operations; No. 2—heavy running maintenance; Nos. 3 and 4—cleaning and light running maintenance; Nos. 5 and 6—SP-owned storage tracks. A short track serves the storehouse. Practically the entire working area, about 2,860 ft long with track spacing of 40 ft, is paved with asphaltic concrete on a crushed-rock base. Bulk storage platforms for heavy materials are concrete, as are the filling station and wash-rack surfaces which must resist oil damage.

Between Tracks 2 and 3—between the light-repair and heavy-repair areas —are five buildings. These structures, varying in length up to 180 ft and with widths of 40 and 50 ft, are of steel-frame and sheet-metal construction,

BUCKEYE HOT DIE PRESSED BOLSTER CENTER FILLERS

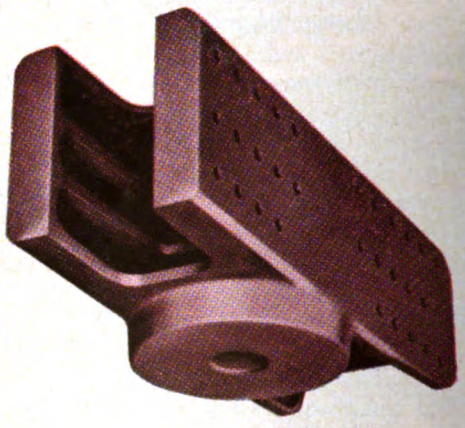


WELDED APPLICATION
STANDARD DESIGN
FOR BOX CAR
5'6" OVERHANG

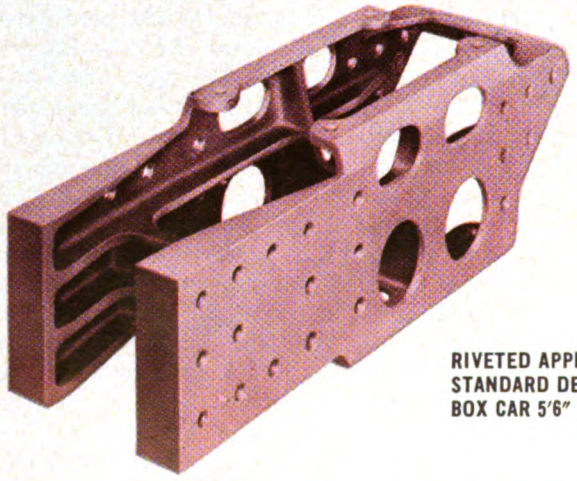
Economical . . No machining required . . all rivet holes drilled.

Accurate . . All fitting surfaces pressed to A.A.R. tolerances.

Wide Selection . . Choice of riveted or welded application . . with or without integral cast center plate . . 5'0" or 5'6" overhang.



RIVETED APPLICATION
INTEGRAL CAST CENTER PLATE DESIGN
FOR HOPPER CAR 5'0" OVERHANG



RIVETED APPLICATION
STANDARD DESIGN FOR
BOX CAR 5'6" OVERHANG

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Refer Adv. No. 11888

The Buckeye Steel Castings Co.

MEMBER

COLUMBUS, O.
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SAN FRANCISCO, CALIF.

ept for the office building which is crete block.

Building 1, the main office, con- s the offices of the shop superin- dent, district storekeeper, and fore- n, and the shop's locker and lunch m. Building 2 houses the fire equip- nt and a charging station for per- nel carriers which are battery op- ted.

Building 3 is a storehouse for mate- s, such as plywood, insulation, fin- ished lumber, and car hardware. Building 4 is the combination fabrication shop, machine shop, welding shop, and blacksmith shop. Equipment for repair and manufacturing of various car parts is housed in this 50-ft by 180-ft building. Included are wood-mill and sheet-metal tools, fan repair and testing equipment, and air-brake repair facilities.

Building 5, the shop-equipment maintenance center, also has storage areas for tools used on the repair tracks. The air compressor and the paint storage and mixing facilities are also in this building.

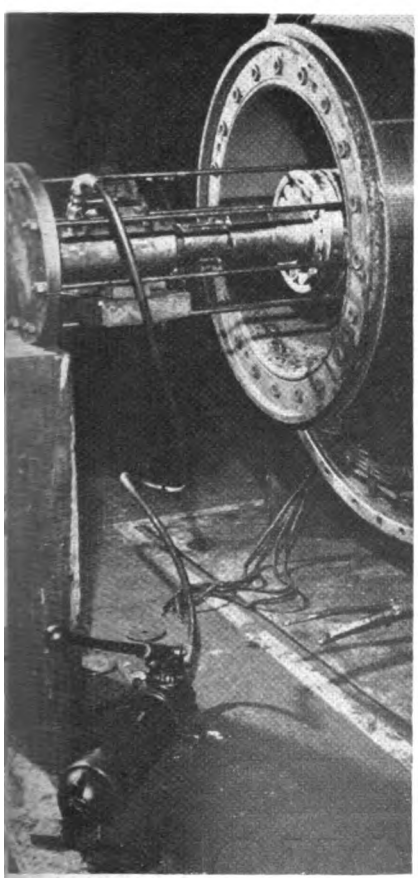
Building 6, the mechanical refrigeration shop, his a floor-operated, 1½-ton overhead electric crane to simplify equipment assembly operations. At the east end is a small 12-ft by 16-ft building for testing diesel engines and for charging and repairing batteries for the mechanical cars.

ydraulic Fixture Removes Bearings

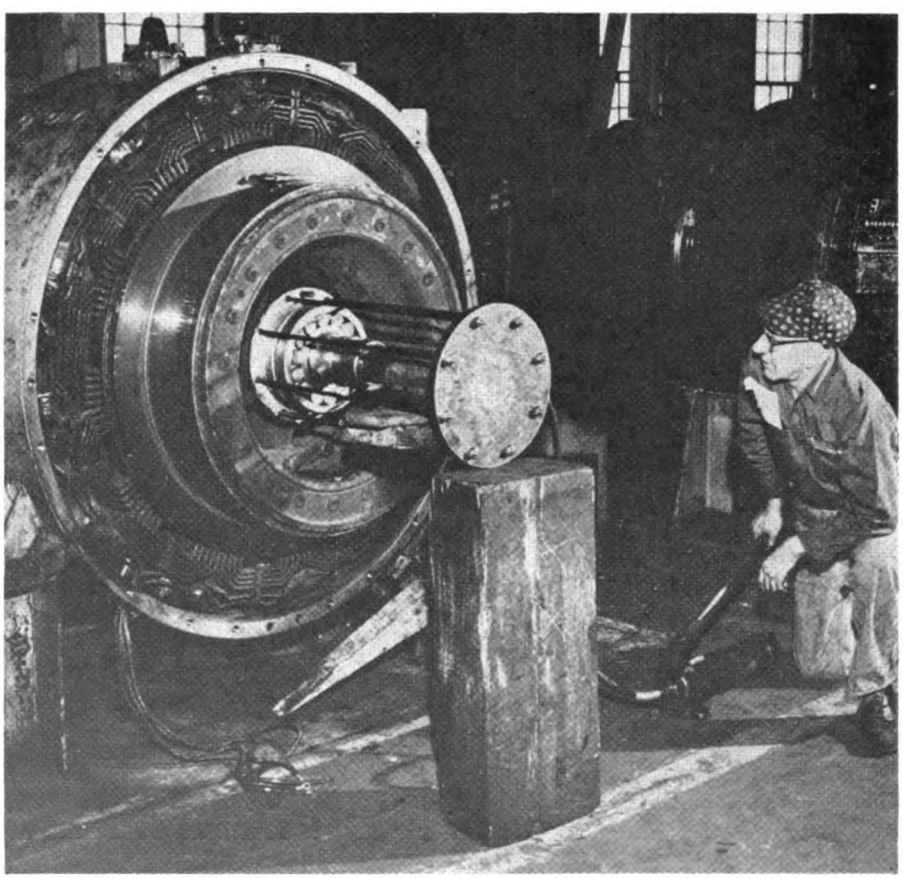
The Milwaukee now removes main- erator armature shaft bearings at Milwaukee, Wis., shop without us- heat. With a high-pressure hydrau- system, a bearing is pulled in 1 hr compared with 3 hr required when bearing was heated to expand it so could be removed. This new pro- lure simplifies checking of the $200 ring to determine if it can be re- d.

The pulling fixture consists of eight ½-in. SAE studs and a steel plate. Power is supplied by an EnerPac S-180 hydraulic set consisting of a P-85 hand pump, hose, and 50-ton ram. To pull the bearing, the studs are threaded into eight evenly spaced holes in their sealing collar mounted behind the bearing on the armature shaft. A nut is pressed into each of these holes before the collar is installed during initial assembly of a new generator.

The hydraulic ram, facing inward toward the armature shaft, is attached to the metal plate which, in turn, is attached to the studs. When the hand pump is operated, the ram plunger extends and bears against the armature shaft. The base of the ram pushes outward against the plate that forms the base of the pulling fixture, causing the collar back of the bearing to move outward and bring the bearing with it. Both collar and bearing are heated for application during assembly.



d-operated hydraulic pump powers ram that wers fixture removing generator bearing.



Use of hydraulic fixture has speeded removal of bearings. Fixture rests on block so it can be aligned with armature shaft. Heat damage to bearings can now be avoided.

MARK UP

YOUR DRAFT GEAR PROTECTION...

MARK DOWN

YOUR COSTLY DAMAGE CLAIMS!



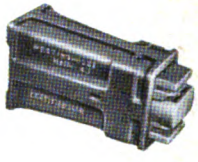
Our line of "MARK" Gears is "tailored" to your requirements! There's a sturdy, high capacity Westinghouse "MARK" Gear to meet every damage-claim-reducing requirement.

Each of these distinctive Westinghouse Gears is A.A.R. Approved. In each Gear you'll find the highly desirable combination of HIGH CAPACITY and LOW REACTION FORCE (sill pressure).

Specify Westinghouse "MARK" Gears for new equipment, for maximum protection. Apply them for replacement when you UPGRADE present equipment!

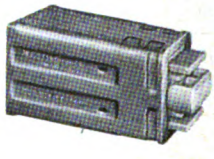
For DOUBLE Protection... Westinghouse

DUAL CUSHION Gear Arrangement: TWO "MARK" Gears right back of each coupler. Shock-absorbing, load-protecting capacity is doubled ...Reaction Force remains less than 500,000 pounds. Use any of these combinations. Mark 50-80 Mark R500-80, or Mark 80-80. A.A.R. Approved



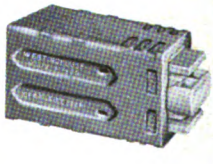
Westinghouse MARK 40

Friction gear for 24¼-inch pockets; 3¼ inches travel. A.A.R. Certificate No. 35, under A.A.R. Specification M901-53.



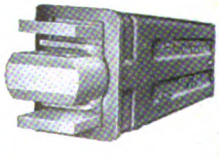
Westinghouse MARK 50

For 24¼-inch pockets; 3¼ inches travel. Friction principle. A.A.R. Certificate No. 41, under A.A.R. Specification M901E-59.



Westinghouse MARK R500

A.A.R. Certificate No. 42; also met A.A.R. Specification M901E-59. Combination friction-rubber, for 24¼-inch pockets; 3¼ inches travel.



Westinghouse MARK 80

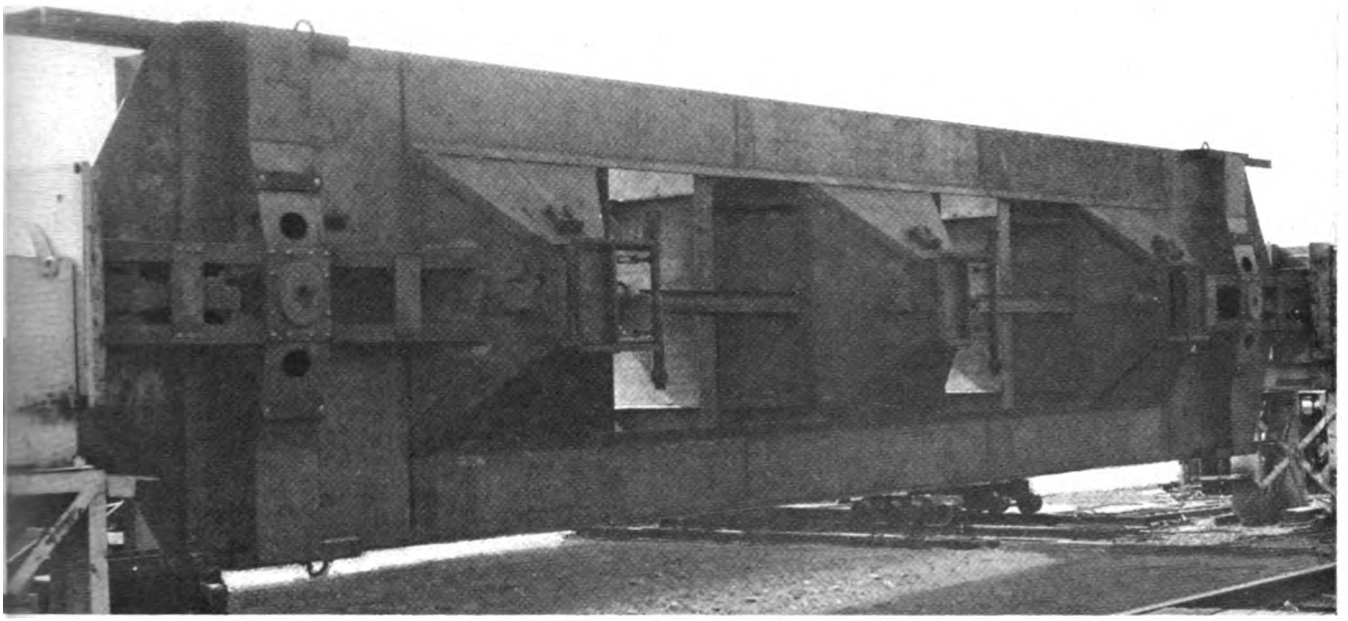
For 36-inch pockets. Extra high capacity friction gear. A.A.R. Certificate No. 37 under A.A.R. Specification M901C-56. Has 4¾ inches of travel.

Always a Leader in Freight Damage Reduction ..

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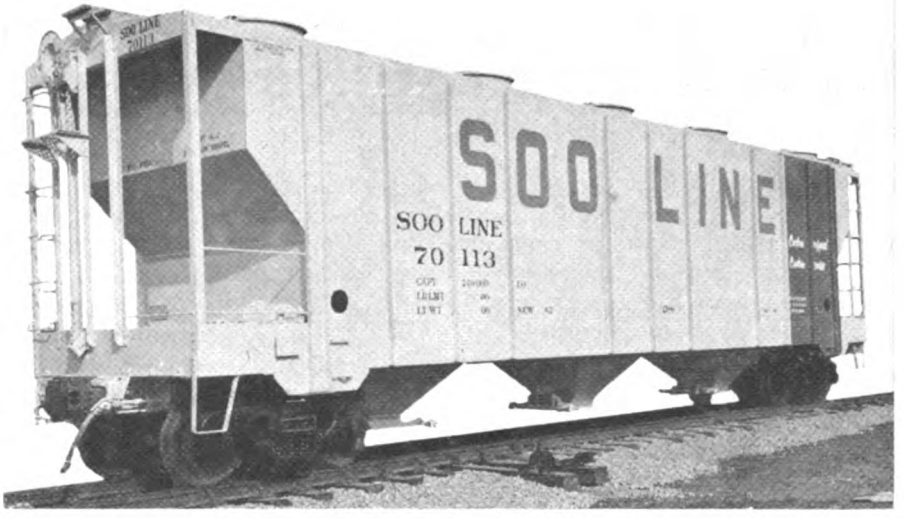


ence of center sill simplifies the installation of hoppers. Heavy shear plates extend under both of the car's side sills.

Covered Hopper Has No Center Sill

Side sills formed of heavy steel annels have made it possible to minate the conventional center sill a new type of covered hopper car. ıe Soo Line has recently taken de- ery of 20 of these all-welded cars llowing their completion at the Ort- r Freight Car Co. They have been ecifically designed to meet the re- irements of the Malt and Barley In- tute. Capacity is 4,000 cu ft. The rs, said to be the first of their shape thout a conventional center sill, are ilt primarily of Cor-Ten steel. They ere designed to have 90-ton capacity id can be equipped with 90-ton ucks having 36-in. wheels. The Soo rs are equipped with 70-ton trucks id 33-in. one-wear wheels because e density of the lading permits loads only 74 tons in 4,000 cu ft. Light eight of the car is 62,000 lb.

Main load-carrying members in the ructure are the side and end sills. he 18-in., 42.7-lb/ft Tri-Ten chan- el side sills are reinforced by ⅜-in. ri-Ten shear plates extending from id to end of the car. Because stabili- ation of the draft sill is of prime im- ortance in a car without a center sill, ıe end sills are Tri-Ten channels of ıe same size used in the side sills. o insure stability of the draft arm in iat area, another transverse struc- ural member was applied inboard of ach body bolster near the point where he slope sheet passes the draft sill. he car ends are strengthened by shear



All-welded car successfully passed squeeze tests at the AAR Research Center in Chicago.

plates extending across the car between side sills and over stub sills.

The side sheets are $\frac{5}{32}$-in. thick and floor and hopper sheets are $\frac{3}{16}$ in. thick. The three center discharge gates are Enteprise Link-Lock type. The outlet pipes of the Enterprise vacuum and gravity outlets are $6\frac{1}{16}$ in. ID. The cars have ten circular hatches with 30-in. diameter openings. Hatch frames and covers are furnished by Youngstown Steel Door. The ASF A-3 ride-control trucks have 2½-in. spring travel and are fitted with 6- x 11-in. Timken roller bearings. The hand brake is Ellcon-National.

The car has a length over coupler pulling faces of 51 ft 5 in. and an inside length of 45 ft. Width over side stakes is 10 ft $6\frac{5}{16}$ in.; inside width 9 ft 10 in.; height over running board 14 ft 11 in.; angle of the slope sheets 47 deg, and hopper openings 13 in. x 24 in.

Following its completion, one of the cars was tested at the AAR Research Center in Chicago (RL&C, June 1962, p 27). Tests were performed in the AAR squeeze test device. Loads up to 1,040,000 lb, in increments of 100,000 lb, were applied to the car. It successfully passed this test, a reproduction of buffing loads which may be encountered in service.



Diesel Hydraulics Handle Fast Freigh

Diesel hydraulic locomotives should prove to be "highly successful haulers of heavy, high-speed freight traffic on mountainous territory." This is the "early conclusion" of the Denver & Rio Grande Western as reported by J. J. Schmidt, assistant director of research, in Chicago last month. He told the American Association of Railroad Superintendents of D&RGW experiences with its three 4,000-hp diesel-hydraulic units during their first six months of service. He also reported on the shake-down troubles encountered.

"In tests on ordinary rail in good condition, tractive efforts of 118,000 lb without sand and 128,000 lb with sand have been recorded," Mr. Schmidt said. "On snow-covered rail, trains have been started with initial drawbar pulls of 220,000 lb with two units. Adhesions of 23% have frequently been measured."

These three locomotives, along with three duplicates for the Southern Pacific, were built in West Germany by Krauss Maffei last year (RL&C, Sept. 1961, p 23). Each unit weighs 165 tons and is powered by a pair of Maybach 2,000-hp engines. Each engine drives one of the unit's pair of three-axle trucks through a Voith hydraulic transmission, intermediate gear box, and cardan shafts (RL&C, June 1962, p 31). The design originated in 1957 when a Rio Grande appraisal of its motive-power requirements for the near future indicated that competition for freight traffic would require "an excessive number of diesel [electric] units" to produce the desired train speeds. A study of locomotive developments in other countries showed that considerable progress had been made in utilizing a hydraulic transmission with a diesel engine to give a locomotive with good speed characteristics, low weight per horsepower, high adhesion, and low maintenance costs. Specifications were then prepared to cover a locomotive that would handle tonnage up to a drawbar limit of 180,000 lb on a 2% grade at a speed of 17 mph without helper locomotives. Contract to build the three units was eventually awarded to Krauss-Maffei. The carbody profile was designed to permit testing in Europe.

Each unit is fitted with two Maybach MD 870 engines. Each engine is equipped with two turbochargers and each turbocharger is followed by an intercooler. Manifolding arrangement is such that each turbocharger supplies the air for one bank of the V-16 cylinder engine. Under standard test conditions, the output of each engine is 2,000 hp at 1,580 rpm. In operating condition, and subtracting for auxiliary devices, the input to each transmission for traction is 1,770 hp at 1,580 rpm, thus each locomotive unit may be rated at 3,540 hp into the transmission.

The hydraulic transmission is manufactured by Voith and designated Model L 830 RU. The transmission consists of three hydraulic torque converters and a built-in reversing gear. Power input is through a cardan shaft and flange to a step-up gear. The transmission also has an output flange for driving the starter-generator.

"Each torque converter is designed to give a parabolic tractive effort curve, with the operating point of highest efficiency selected for speeds of 27, 41 and 59 mph," Mr. Schmidt explained. "Each converter is designed to operate over a well-defined speed range. The changeover from one converter to another is accom-



ccessfully

hed by emptying and filling. For ting, Converter 1 is filled by open- the throttle. As the throttle is ned and engine speed is increased, k speed likewise rises. Depending the track speed and the output of diesel engine, Converter 2 begins ill automatically at approximately mph, while Converter 1 starts to pty. At 34 mph, the transmission orque is transferred to Converter aving picked up the full load when nverter 1 is completely emptied. about 49 mph, the process is re- ted with Converter 3 filling and nverter 2 emptying. Changeover es place at 51 mph when decelerat- . All the reverse processes come) effect with changeover points htly offset to prevent 'hunting' in controls. Changeover is carried by a gradual shift in torque trans- mission. There is no shock or break in the tractive effort curve. During train operation, it is practically impossible to detect the point of transition from one stage to the next. Even measurements at the drawbar do not show any interruption in tractive effort at changeover points. In this transmission, all gears are permanently meshed and there is no clutch action of any sort to generate wear and tear. Only when the locomotive is at a complete standstill may the reserving gears be engaged by means of a sliding gear and splined shaft arrangement."

In the operating range of 14 to 32 mph, the efficiency of the first stage ranges from 79 to 85%. From 32 to 51 mph, the efficiency of stage 2 is from 82 to 88%. Stage 3, covering the speed range from 51 to 70 mph, has an almost flat efficiency curve running between 81 and 82.5%. The overall efficiency loss in the intermediate and final gear drives runs between 1½ and 3%.

A unique feature of this transmission is the inclusion of a hydrodynamic brake which is required to duplicate closely the dynamic braking characteristics of the diesel-electric locomotive. Attached to the secondary shaft of each transmission is a hydraulic coupling whose housing is bolted to the transmission case. Transmission oil is supplied to this coupling during braking and is then circulated to the two transmission oil heat exchangers. During braking, both the engines and transmissions are unloaded and the full capacity of the radiator is available to absorb the heat generated by dynamic braking. During braking, therefore, a hydraulic short circuit is set up between the brake impeller and the heat exchanger. The braking force is regulated by an eight-step controller which is in the line between the filling pump and the brake housing. This regulator throttles the flow of oil and, therefore, the pressure in the brake housing. The braking effort depends on train speed and pressure in the brake housing.

Typical train hauling performances for the three diesel hydraulics in m-u have included 5,350 adjusted tons on an ascending 1.38% grade at 17 mph; 5,000 adjusted tons on a 1.42% grade at 16 mph; 2,815 adjusted tons on a 2% grade at 23.5 mph.

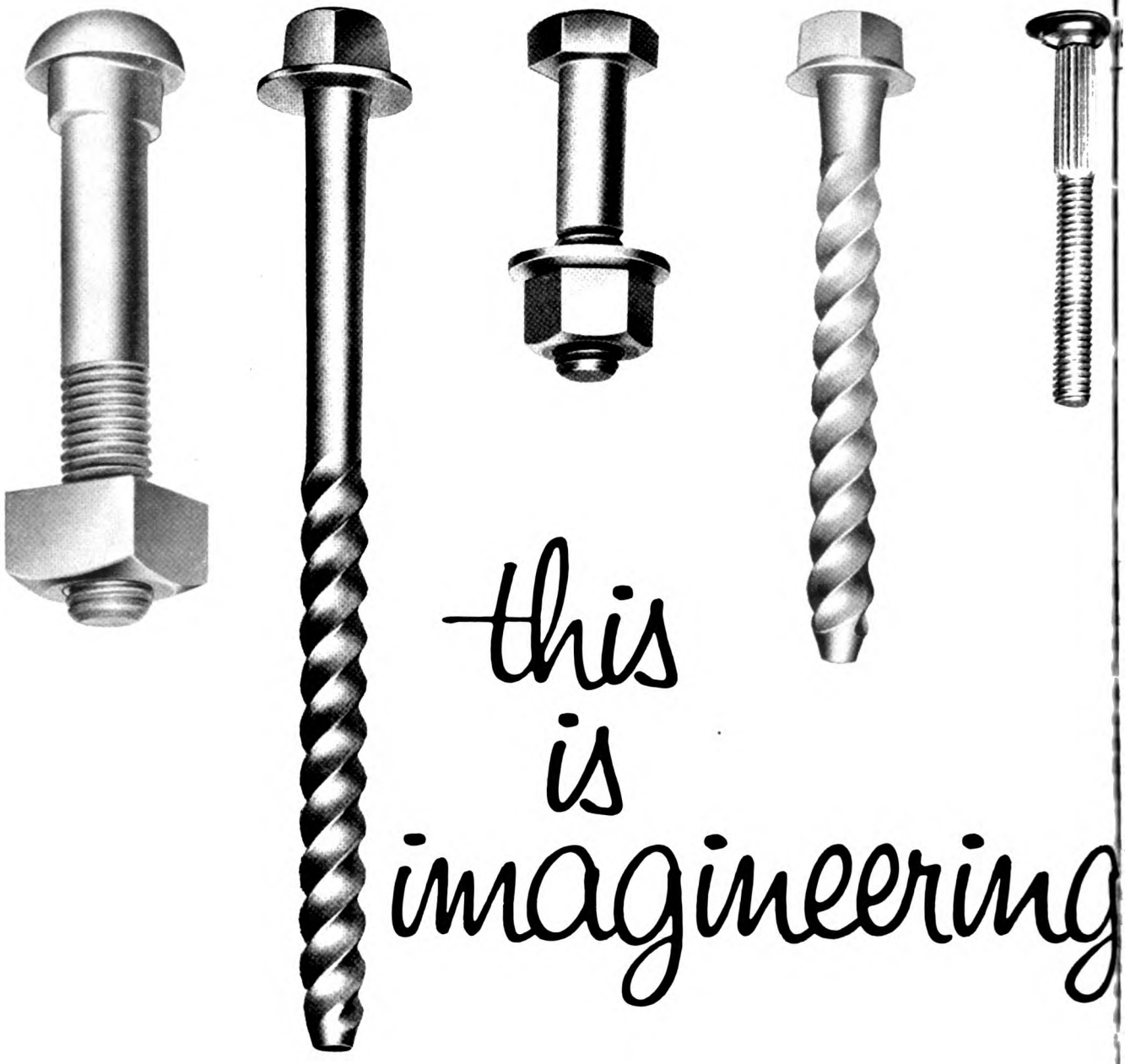
Difficulty was encountered with the pneumatic throttle for multiple-unit control, and this is now being changed to the electro-pneumatic system used on American diesel electrics.

Air intake for the diesel engines has also been changed. Poor combustion at high altitude and in long tunnels resulted from the original intake location. This caused considerable valve damage on the engines. As a result, there have been many valve and cylinder-head changeouts. At the present time, valve rotators, newly designed valve-stem clearances, quick-acting hydraulic valve lash adjusters, and excess fuel limiting features on the governors have been installed in the engines. The early results show increased combustion efficiency, cooler engine operation, and satisfactory turbocharger operation at all altitudes. As far as the hydraulic transmission is concerned, with the exception of the pneumatic control and safety devices that earlier caused trouble, there have been no cases of difficulty. As control and safety features are converted to electric operation, the only maintenance work required on the transmissions has been checking of the oil level and sampling for laboratory analysis at semi-monthly periods. Semi-annual inspection of the transmissions showed that all gear teeth surfaces still bear original grinding and polishing marks with no discernible wear.

Some difficulty has been experienced with truck springing and with flexible equipment mounts designed for European service where track joints are opposite rather than being staggered as in North America. New truck springs have solved the carbody rolling problem and problems with breaks in piping have been overcome. Two cases of material defects have put units out of service. One was the failure of a roller bearing cage in one of the axle drives. The second was a wheel failure which originated at a piece of slag that had been rolled into the wheel during manufacture. In both cases the drive shaft to the affected axle was disconnected. With the wheel failure, the axle involved had to be jacked and chained off the rail. The units involved were then able to come to the shop under their own power in each case.

Typical Tonnage Ratings for D&RGW Locomotives

Grade	1.5%	2%	3.3%
Diesel hydraulic, 4,000-hp	2,250	1,500	1,000
GP-30 diesel-electric, 2,250-hp	1,550	1,050	700
GP-9 diesel-electric, 1,750 hp	1,300	920	600



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Sparks Learns More About the GP-20



By Gordon Taylor

he horses that power these GP-
ure have to know their business
p step with this control system."
speaker was Sam Sparks who,
his partner Bob Brown, was
ing the wiring prints and instruc-
on the General Motors GP-20
being put in service at Center-
"We'd better get Doc Watts to
s more about these units."
ey stopped Doc who was passing
gh the shop. "What's bothering
now?" he asked. "When I ex-
d yesterday that the transduc-
sed in the wheel-slip control cir-
are saturable core reactors, you
s said you understood." [See
ting an Old Friend with a New
," RL&C, June 1962, p 49—
r.]
do have some other questions,"
s replied; "but now that you
on the transductor, there is one
thing I would like to know about
understand that the control fea-
lepends on flux saturation in the
core which varies the reactance
imits the current in the a-c coils.
steel core is like a sponge. When
nge is full of water, it is saturated
an hold no more. If the trans-
r core is saturated with magnetic
enerated by the d-c coil, the core
ot accommodate additional flux
ated by the a-c coil. As a result,
eactance in the a-c circuit is re-
l, allowing the current in the a-c
o rise so that it activates the
-slip control functions. That's
isn't it?"

ries of articles is based on actual experi-
of men who operate and maintain diesel-
locomotives.

"It is," replied Doc. "What's bothering you?"

"I'm wondering," said Sparks, "why the saturable reactor does not have a single bar for a core with one a-c winding and one d-c winding on it. Instead, there is that 'three-leg' core with the d-c winding on the middle leg and an a-c winding on each of the outside ones."

"Well," replied Doc, "you can bet that EMD would use that arrangement if it were the most practicable. Normally, we can just familiarize ourselves with the devices on a locomotive and not have much chance to speculate on other possible arrangements. In this case, there is an answer to your question which will give you a better understanding of the working of the transductor, so let's discuss it right now.

"I agree that, at first glance, it might appear that a saturable reactor could be constructed with one a-c winding and one d-c winding around a common core. This simple construction would not be satisfactory, however, because flux variations produced by the alternating current would induce large voltages of changing magnitude in the d-c winding.

"To be satisfactory, the saturable core reactor must be so constructed that the d-c winding is unaffected by the flux generated in the a-c windings. This can be accomplished with the 'three-leg' core. The currents in the two a-c coils tend to produce flux in opposite directions through the central core around which is the d-c winding. Therefore, the effects of the currents in the a-c windings are neutralized in the core where they could affect the d-c circuit. The alternating flux passes only through the outside legs of core, because it has been neutralized on the center leg.

"This is not the case with flux generated by currents in the d-c circuit. This d-c flux passes through the center core and through both legs of the outer core. It divides on leaving the center core with half passing through the left-hand outer core and half through the right-hand core. This puts the d-c flux in the outer paths where it can change the reactance in the a-c coil.

"Now do you understand why the transductor is constructed on a three-leg core?"

"Yes, indeed," said Sparks. "I've come on another puzzler on this wiring diagram. It shows a battery-charging rectifier in the positive lead from the auxiliary generator to the battery. Why on earth would we need a rectifier in a d-c circuit? The current doesn't need to be rectified; it's already d-c. You've told us that the builders are trying to eliminate needless parts, and this rectifier seems needless to me."

"You can be sure," replied Doc, "that the builder wouldn't install a rectifier unless it would serve a useful purpose. Are you sure that it doesn't eliminate some other item that is more likely to fail? In checking that print, have you found any other item missing that has been used on all the older units that we have?"

"Now that you mention it," said Sam, "one of my next questions was to be 'where is the reverse current relay?'

I haven't been able to find 'RCR' on this wiring diagram."

"You are on your way to answering your own question," Doc responded. "The reverse current relay connects the auxiliary generator to the battery when generator voltage becomes greater than the battery voltage. That starts charging of the battery.

"The RCR also prevents battery current from 'motoring' the auxiliary generator when auxiliary-generator voltage drops below battery voltage. The RCR acts much like a check valve in a water line. In the battery-charging circuit it permits current to flow to the battery under proper voltage conditions and prevents back flow of current from battery to generator.

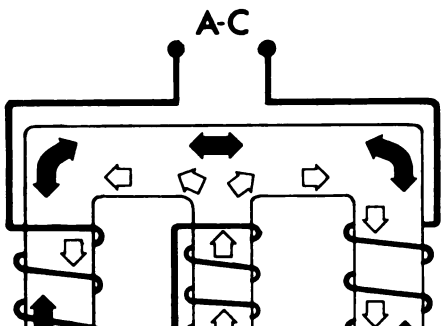
"A rectifier is used ordinarily to produce direct current from an alternating current source. It also has characteristics of a check valve passing current in only one direction. On the GP-20 the rectifier is in a d-c circuit in which current cannot be rectified. It is used solely because of its ability to pass current in one direction. Connected to the auxiliary generator, the rectifier passes battery-charging current to the battery at all times that the generator voltage exceeds the battery voltage. If the generator voltage falls below battery voltage, the rectifier prevents current flow to generator.

"It is not difficult to see why a static device has been substituted for the RCR relay with its moving contacts. This substitution should reduce maintenance requirements."

"I get it," said Sam. "Now, could you tell us something about the device marked 'CP' on the wiring diagram? Our older units don't have anything like that."

"When first I checked this diagram," said Doc, "I discovered that CP is the 'crankcase pressure' switch. Its metallic tube extends into the engine crankcase. If the oil-pan pressure exceeds a setting, the pressure switch is tripped. When it opens, a red indicator lights on the switch, while the DV solenoid in the governor is energized and the ER relay is de-energized to stop the engine. The NVR (no voltage relay) will drop out FPC (fuel pump contactor) to stop the engine.

"The CP crankcase pressure switch is called the Engine Protector Switch in the instructions. It shuts the engine down 'to protect it from mechanical damage.' "



Doc used this diagram to explain why the "three-leg" arrangement is necessary for proper function of a-c and d-c circuits.

"Why haven't we had CP switches in the past?" asked Sam. "Why would the pressure rise in the crankcase?"

"We've needed an engine protector switch for a long time," said Doc. "It operates when oil-pan pressure rises as the result of gases entering through cracked pistons, or passing by badly worn or broken rings. When the switch trips, the engine will shut down. You then press the RESET BUTTON on the switch and start the engine again. If 'engine protector' action shuts the engine down again, you should *remove the engine from the line;* it means that the engine requires repair."

"When the engine protector switch trips, it illuminates a red warning light. Do not confuse this with the alarm signal lights that are located on the cab wall above the electrical cabinet. The red engine protector light is mounted on the engine protector housing in the engine room. This unit has the same three colored lights that are used on the older style units. These lights are:

- Red—Hot engine caused by excessive cooling-water temperature;
- Amber—Low oil caused by low oil pressure on high oil suction in engine lubricating system, or *low oil pressure in turbocharger lubricating system.*
- Blue—No power caused by alternator failure, or by stopping of the diesel engine.

"It would be well to mention so thing more about the Blue 'no po light. On the GP-20 it gives an cation that it never did on older Doc continued. "Remember that locomotive has a turbocharger makes it possible to burn more fu develop more power. When sta the engine and during operation at throttle postions, the turbocharge driven directly by the diesel eng This provides the necessary combus tion air during the period when eng exhaust gases do not have enough ergy to drive the turbine and compr sor at a high enough speed. When engine reaches about two thirds of rated power, an over-running cl disengages the turbocharger from engine drive so that it becomes 'f wheeling.' At this time the energy the exhaust gases is sufficient to pow the turbine and its compressor supp ing the combustion air.

"When the engine stops, a mo driven lube-oil pump will begin op ating to circulate oil through the t bocharger so it will be cooled gra ally. This pump operates *only* w *main battery switch is closed* and turbo lube-oil-pump switch is in ON position. When the engin stopped, the NO a-c voltage re NVR, drops open. Its E-F interlo close, establishing circuits to the t bine lube-oil time delay relay, TLT and to the turbine lube-oil-pump co tactor. The turbocharger lube-o pump motor continues to pump oil 15 min to cool the turbocharger be ings. At the end of this time t TLTD relay will open the circuit, sto ping the pump. Now here is the poi When the engine stops, the blue N Power light will be lighted to indic that the turbo-lube-oil pump is ru ning if the main battery switch h been left closed and the turbo lube-c circuit breaker is in the ON positio It's very important that the main b tery switch be left closed, for this co down period.

"Unless you fellows have anoth question about control circuits, wa wrap this up. I am certain you w agree that the GP-20 incorporates se eral improvements over older mod When we think of the changes that t builder has made since the days of t FT, we wonder what later models w have on them. As long as new loc motives are built, we must continue study the 'why' and 'how' of their co trols."

What Is Your Problem?

e Locomotive Maintenance Officers Association is introducing a new feature in its annual meet- g program. On Wednesday morning, September 19, at the Sherman House, Chicago, a panel ll offer the solutions to any and all Diesel Maintenance Problems not covered by the seven tech- cal committee reports.

Chairman of the "What is your oblem?" panel is J. J. Dwyer, chief mist-system, Chesapeake & Ohio. sisting Mr. Dwyer will be the fol- ving chairmen of the LMOA's seven hnical committees: Electrical Main- ance —C. J. Frey, electrical depart- nt foreman, Chicago, Rock Island Pacific; Fuel and Lube Oil—C. A. lson, general supervisor diesel en- es, Atchison, Topeka & Santa Fe; w Developments in Motive Power aintenance—W. F. Dadd, general perintendent motive power, Balti- ore & Ohio; Shop Equipment—S. C. Snow, superintendent motive power, Louisville & Nashville; Diesel Engine Maintenance—G. W. Niemeyer, mechanical superintendent, Missouri Pacific; Diesel Mechanical Maintenance —Other than Engine—T. W. Bellhouse, superintendent mechanical department, St. Louis-Southwestern; and Diesel Material Inventory and Control—K. L. Pollitt, manager system assembly shops, Southern.

Backing up the panel will be LMOA members representing other railroads, all experienced men and authorities on motive power maintenance.

The LMOA is aware that time may not permit the presentation of solutions to all problems at the September 19 session. Starting with our October 1962 issue, we will devote one or more pages to the publication of problems and solutions not presented at the annual meeting session. This feature will be continued each month until such problems and solutions have been published.

s an example of the type of problems that will be solved at the September 19 session, a problem and its solu- on from the LMOA's 1961 annual meeting are given below:

roblem: At what mileage should a action motor be shopped?

olution: Each railroad operates der different conditions, different ading characteristics and different rrain. Each individual railroad must amine its equipment, either from cords or by visual inspection, and ereby determine their changeout pe- od. From 400,000 to 500,000 miles ems to be the average general angeout mileage for traction motors though some roads get more miles.

Railroads figure that a switch en- ne would need approximately from 2 to 16 years to give them the equiv- lent wear to 400,000 or 500,000 iles in freight and passenger service.

If a traction motor makes the com- lete service life that was expected from it, it should be removed from the locomotive, sent to a repair shop, and be given a basic overhaul. The basic overhaul would consist of removing the armature, cleaning, checking and inspecting all component parts.

From inspection you would then determine if further repair was necessary. It is not advisable to go beyond the basic overhaul if it is not required. We should get as many miles out of every piece of equipment as possible, but when a traction motor is in the shop for repairs it should be brought back to a standard that will give it the life necessary to run the miles expected of a reconditioned motor. This does not necessarily mean that the armature life will be the same as a new one, but it should be capable of running the complete life expectancy of the motor.

If railroads analyze the average miles they are receiving from motors removed from service, and use that as a basis for determining the life of a motor, then they can predict at exactly what point it is economical to remove motors from service. All want from 400,000 to 700,000 miles or more. Whether or not you get this mileage, the percentage of motors that make that mileage should determine whether or not the changeout periods should be increased or decreased. If 80 per cent of the motors are failing before they reach the expected number of miles the mileage and changeout time should be reduced. If 80 per cent are making it the mileage changeout should be increased.

)o you have a locomotive maintenance problem? If you do, write it on the coupon and send it to he Editor, Railway Locomotives and Cars, 30 Church St., New York 7, N. Y. He will see that it s directed to Mr. Dwyer for solution by the LMOA.

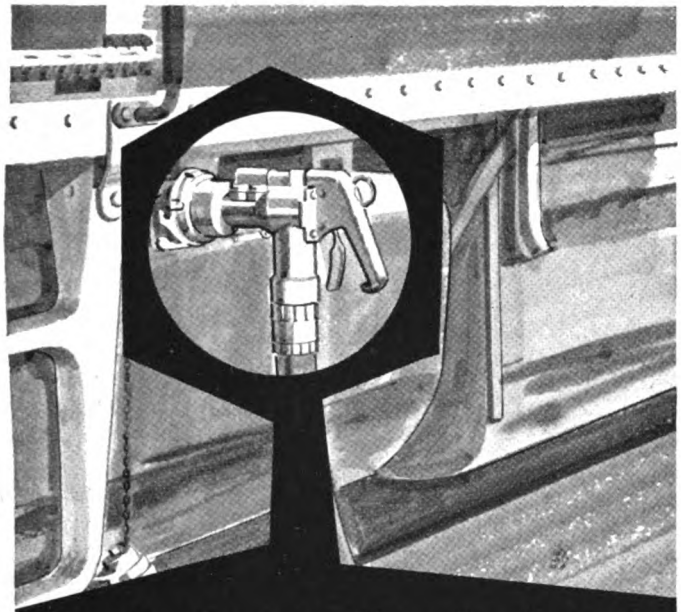
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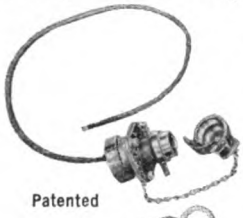
Name ..... Title ..... Railroad .....



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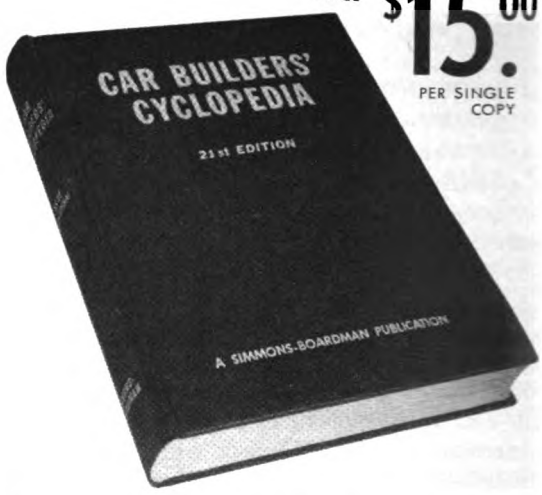
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(Continued from page 10)

nded through the flange, the rim, and plate to a point 10 9/16 in. from the center of the hub. At one of the letters, 28½ circumferentially from the figure "1," a nd radial fracture extended through the ge, the rim, and the plate to a point 16 in. from the center of the hub. A ture through the plate connected the radial fractures at their points nearest he hub and extended circumferentially ugh the plate at distances varying be- en 9¾ and 12 1/16 in. from the center of hub.

Laboratory analysis of the broken wheel closed that the steel met the chemical re- rements of AAR Specification M-107-59 class A wheels, and that the Brinell dness was within the specification range 255-321 for class AE wheels. The in- ction at the laboratory also disclosed that failure originated in the figure "1" of identification characters stamped on the k face of the rim, and that this figure s stamped to a depth of ⅛ in. rather n the nominal depth of 3/32 in. as pre- ibed under AAR Specification M-107-59. microscopic examination of a section of failure at this point revealed the micro- ucture to be satisfactory, except for some arburization immediately below the mped figure "1."

"It is apparent," said the Commission, at high unit stresses developed in the re- ced thickness of the flange of the broken eel, and that the relatively sharp stamp- impression at the bottom of figure '1' vided stress concentration points where cks developed and progressed into the nge so as to cover an area of approxi- tely 1 13/16 in. by ½ in. before ultimate lure occurred."

ersonal Mention

mingham Southern.—*Ensley, Ala.:* G. C. CDONALD appointed general foreman car partment.

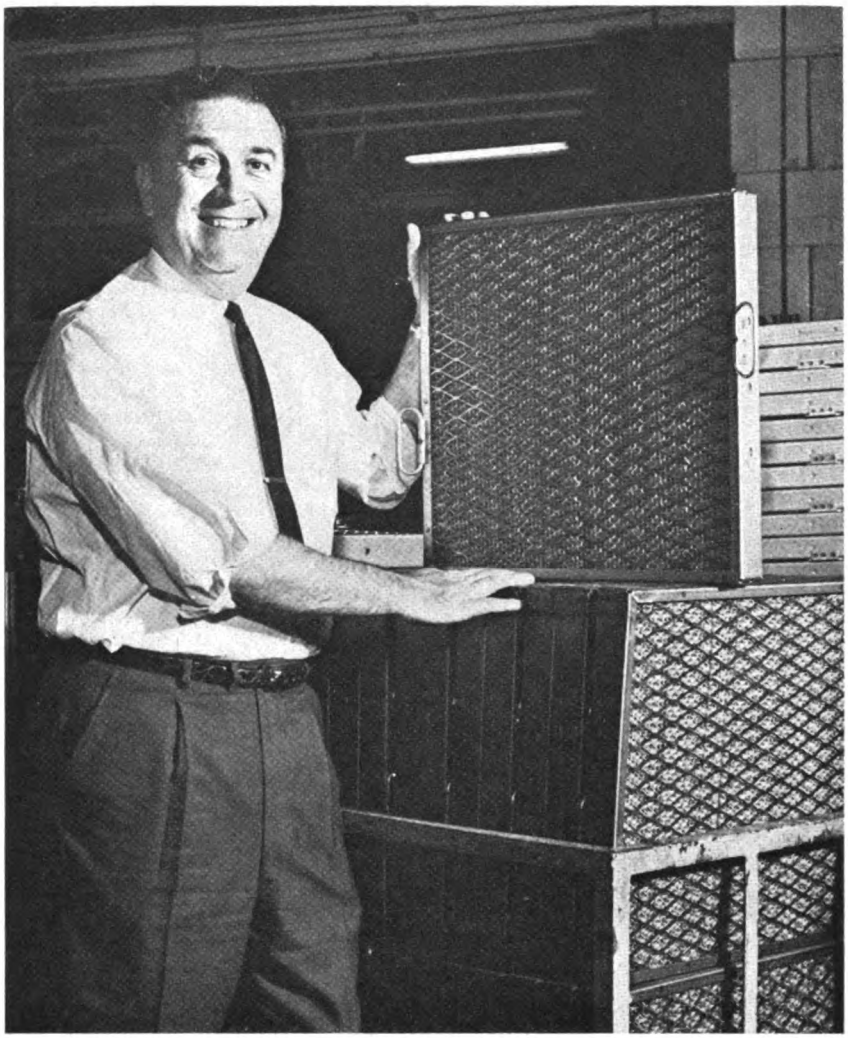
rlington.—*Chicago:* HENRY BLITZ, assist- t electrical engineer of equipment, ap- inted electrical engineer of equipment, cceeding D. F. CARTER, retired.

nadian National.—*Campbellton, Alta.:* D. MACFARLAN appointed master mechanic. rmerly master mechanic at Edmundston, lta.

ntral of Georgia.—*Macon, Ga.:* JOHN H. ILLIAMS appointed to newly created posi- n of general foreman of engines.

esapeake & Ohio.—*Saginaw, Mich.:* W. O. LAZIER appointed assistant general car in- ector. *Peach Creek, W. Va.:* W. S. DUKE, ., appointed general foreman. *Columbus, hio:* JOHN RIDDLE, JR., appointed road reman of engines-assistant trainmaster, ocking Division, succeeding H. L. SCHEE- ER, deceased. *Clifton Forge, Va.:* E. W. ALIAFERRO appointed mechanical super- isor-diesels.

hicago & Illinois Midland.—*Springfield, Ill.:* . B. LICHTENBERGER appointed master me-



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chanic, succeeding M. N. ETTINGER, retired. Position of assistant master mechanic abolished.

Chicago, Rock Island & Pacific.—*Chicago:* H. NOBLE, assistant to vice president-operations, appointed acting superintendent of department.

Florida East Coast.—*St. Augustine, Fla.:* THOMAS W. SOLOMON appointed shop engineer.

Frisco.—*Springfield, Mo.:* J. L. RYAN, assistant to chief mechanical officer, retired.

Illinois Central.—*Chicago:* HAROLD J. DAWSON appointed master mechanic, succeeding JOSEPH W. TRAGNITZ, deceased. *Vicksburg, Miss.:* NORMAN LAHNDORFF appointed assistant master mechanic, succeeding M. Dawson. *Hazel Crest, Ill.:* NORMAN R. SEELEY appointed general foreman, Markham locomotive shop, succeeding Mr. Lahndorff. Mr. Seeley formerly general foreman, Johnston Yard, Memphis, Tenn.

New York Central.—*Collinwood, Ohio:* O. LARSON appointed supervisor of training, mechanical.

Norfolk & Western.—*Roanoke, Va.:* JAMES D. WILSON appointed assistant foreman, diesel shop, succeeding Frank Hogan, retired. HERBERT R. CROWDER appointed gang foreman, freight-car shop, succeeding Mr. Wilson. *Shenandoah, Va.:* JAMES B. SHREWSBURY appointed gang foreman, Williamson car department, succeeding Mr. Crowder.

Pennsylvania.—*Philadelphia, Pa.:* GEORGE R. WEAVER appointed assistant chief mechanical officer-motive power. RICHARD C. JOHNSTON appointed superintendent of equipment, Philadelphia Region, succeeding Mr. Weaver. *Pittsburgh, Pa.:* JOHN C. WHITE appointed superintendent of equipment, Pittsburgh Region, succeeding Mr. Johnston. Mr. White formerly superintendent of equipment, Southwestern Region.



George R. Weaver

Mr. Weaver, assistant chief mechanical officer-motive power, started as a special apprentice at Altoona Works in June 1930, subsequently serving as foreman, assistant master mechanic, master mechanic, superintendent of motive power, at Pittsburgh and assistant manager, Altoona heavy repair shops. He was appointed superintendent of equipment at Philadelphia in 1958.

Southern.—*Knoxville, Tenn.:* GEORGE E. McCRARY appointed road foreman of engines.

Texas & Pacific.—*St. Louis, Mo.:* Jurisdiction of J. G. GERMAN, chief mechanical officer, Missouri Pacific, extended to include the T&P.

pply Trade

CTRO - MOTIVE DIV., GENERAL ORS.—Factory branch facility at Hazel-l, Mo., expanded by 60,800 ft to im-e service to customers in St. Louis, area.

■

INDUSTRIES. — *Herbert D. Allee,* appointed field engineer, Chicago dis-sales office, replacing *J. H. Kerns* sferred to ball and roller-bearing man-turer's Railway Sales operation.

■

ABLER MANUFACTURING CO. — *iam G. Young* elected president.

■

/ILBISS CO.—Equipment sales and en-ering, parts and repair service, and house stock located in new and ex-led facilities for DeVilbiss Chicago di-factory branch at 1280 West Washing-Blvd.

■

CKPOLE CARBON CO.—*Chester A. ey* appointed to new post of railway keting supervisor.

■

BS & HILL, INC.—New York offices olidated at 393 Seventh ave., New k 1.

■

LOK CORP. — *William E. Gadd* ap-ted a railroad applications consultant 'aramus, N. J.

■

NA CORP. — *W. Clifford Henderson* ointed sales manager, Universal Joint .

■

ERLESS EQUIPMENT DIV., POOR & —*Paul A. Covett,* sales representative, ointed sales manager.

■

ANS PRODUCTS CO.—*Ralph E. Bell,* road equipment sales engineer at Ply-uth, Mich., appointed western sales nager, railroad equipment division, at Francisco, Calif.

■

IRBANKS, MORSE & CO.—Enlarged road sales organization now under gen-direction of *John W. Chandler,* mana-of diesel sales, with headquarters in oit, Wis. *Robert M. Stacy* transferred n locomotive engineering department to ninistrative sales engineer, railroad prod-s, coordinating all railroad sales and vice activity at Beloit. *Evan J. Phillips* ointed eastern regional manager of rail-d sales, with headquarters at Fair Lawn, J. *Hugh W. Donaldson* appointed mid-tern regional manager of railroad sales, h headquarters in Chicago. *E. R. Har-gton,* locomotive field service depart-men, now midwest manager of locomotive renewal parts sales and service, at Beloit. *Parker H. Brown* appointed manager of renewal parts center at Beloit. *A. J. Belvedere* appointed assistant sales manager of magneto and engine accessories division at Beloit, reporting to *R. D. Hisey,* sales manager.

■

ALCO PRODUCTS, INC. — *Charles C. Davis* elected a vice-president, in charge of marketing of forge and spring products, diesel locomotives and diesel engines in eastern sales division. Mr. Davis formerly industrial sales manager, forge and spring products. Appointed district sales managers for transportation products: *J. F. Brouthers,* Philadelphia, Pa.; *R. R. Drake,* Cleveland, Ohio; *E. G. McCullough,* Schenectady, N. Y., and *J. B. Whitworth,* Washington, D. C.

■

PULLMAN-STANDARD DIV., PULLMAN INC. — *Robert E. Schooley* elected vice-president, in charge of southeastern district marketing office, Birmingham, Ala. Mr. Schooley formerly assistant vice-president marketing, at Birmingham.

■

AMERICAN CAR & FOUNDRY DIV., ACF INDUSTRIES, INC.—*George E. Reed,* assistant director of engineering and research, appointed director of engineering and research, succeeding *Robert L. Evans,* resigned.

■

TRANE CO.—*J. D. Helm* named transportation sales engineer at La Crosse, Wis.

■

M & J DIESEL LOCOMOTIVE FILTER CORP.—Chicago offices moved from 30 West Monroe st., to 200 South Michigan ave.

■

GOULD-NATIONAL BATTERIES, INC. —*Paul Tripi* appointed regional manager, supervising engine parts replacement sales activities in Region 1 from district offices in Boston, New York, Pittsburgh, and Detroit. Regional office located in Tonawanda, N. Y.

WANTED

ailway Supply Co. seeks 1 or 2 established comotive or car products for sale on na-onwide or selected account basis. Box 62, RAILWAY Locomotives & Cars, 22 West adison Street, Chicago 2, Illinois.

Trade Publications

36. HOSE LINES. "The ABC's of Hose Line Replacement" chart tells how to identify and assemble Aeroquip high-, medium-, and low-pressure hose and reusable fittings. Aeroquip Corp.

37. MOISTURE CONTROL. "Moisture-Control: Compressed Air" discusses Van-Air multipurpose dryers and their advantages. Van Products Co.

38. ADHESIVES. Catalog lists, in numerical form, official U. S. Government military specifications, specification definitions, intended application, and corresponding 3M adhesive, coating, or sealer that meets the specifications. Minnesota Mining & Mfg. Co.

39. URETHANE-FOAM BOARD. Brochure describes Dyacor, a rigid urethane foam board, and its applications. Ulta Plastics, Inc.

40. FORGED FITTINGS. Catalog No. 950-3 gives "complete data on over 10,000 types and sizes of forged fittings for wire rope and chain." Crosby-Laughlin.

41. METAL PACKINGS. Booklet AD-166 on metal packings features new non-lubricated rod packing with liquid-cooled packing case and filled Teflon rings for non-lubricated packing service. Garlock Inc.

42. BEARING GREASES. Revised technical bulletin No. 47 covers characteristics and typical data on four Sun N-50 (sodium-soap) greases for use on plain and anti-friction bearings at temperatures up to 250 deg F. Graph on oxidation-inhibited grade, Sun N-52X, also included. Sun Oil Co.

43. DIE CUTTING MACHINERY. "Money-Saving Die Cutting Ideas — From United" tabulates "more than 300 ways in which production is increased and costs reduced by the application of die-cutting machinery" in electrical and transportation equipment and other industries. United Shoe Machinery Corp.

Reader Service

Reader Service Department — July, 1962
Railway Locomotives and Cars
30 Church Street, New York 7, N. Y.

WHAT'S NEW—Send more information on products beginning on Page 13:

7-1 7-2 7-3 7-4 7-5 7-6 7-8

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36 37 38 39 40 41 42 43

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52B 53 54

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Railroad .....

Company Address .....

City ..... Zone ..... State .....

Products Reference No. 52A



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USE AS A SPRAY in water or petroleum mix... as steam cleaning compound... as pressure spray for engine top deck, crank case, air box and covered plate overhaul... for small parts dip tank operations. F.O.-300 also works well for general degreasing.



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- 100% longer service life — unique construction of the filter batt resists face-loading . . . permits uniform depth-loading.

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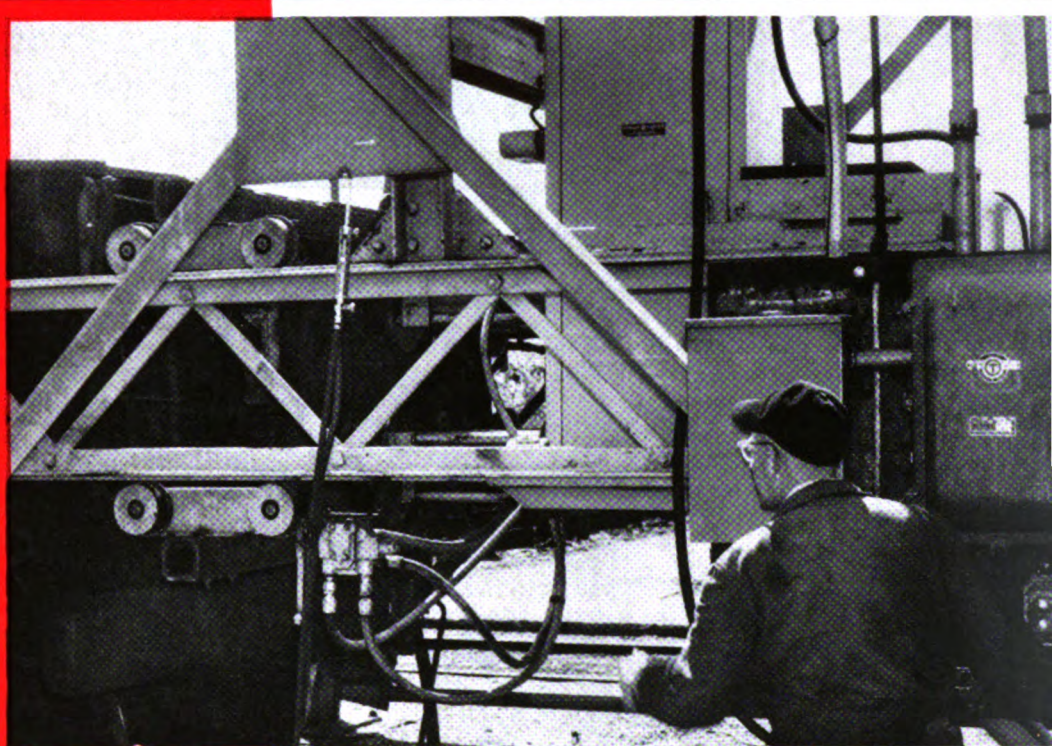
Reefers Need Precise Controls

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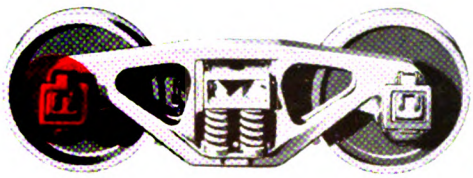


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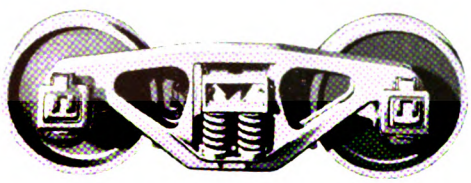


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WHICH ONE IS HOT?



You can never be sure without SERVOSAFE® Hot Box Detectives*

Ironically, many of the measures directed toward *preventing* hotboxes have the secondary effect of making them harder to detect by ordinary visual and manual inspection when they do occur. Improved lubricants withstand higher temperatures before breaking down and releasing tell-tale smoke. Lubricator pads, admirable successors to waste packing in most respects, are less subject to smoking and ignition. Roller bearings, with their fine record of performance, give virtually no warning short of burnoff when they do fail. Add to these problems of detection the greater speeds and heavier loads of the modern freight train and it is no wonder that derailments due to hotboxes continue to mount despite the most careful inspection procedures.

Long before a faulty bearing or journal begins to reveal its condition to the eye or hand, events take place within the journal box which are readily detected by a SERVOSAFE® system. An ultra-sensitive, high speed infrared element "looks" at the same area on all passing journal boxes, regardless of speed, and reacts individually to the heat radiating from each one. These responses are converted to electronic signals which are amplified and mechanically recorded to give a permanent record of all journals on the train. Hotboxes—even those that are just *beginning* to overheat—are easily identified by high "pips" on the SERVOGRAPH® chart. These pips are not measurements of temperature but relative indications of overheating, using the normal average of the other journals as the reference standard, plainly visible on the same chart. The SERVOSAFE® system is not intended to *replace* conventional inspection but, rather, to *supplement* it—with a degree of certainty and reliability not possible to achieve by visual and manual means alone.

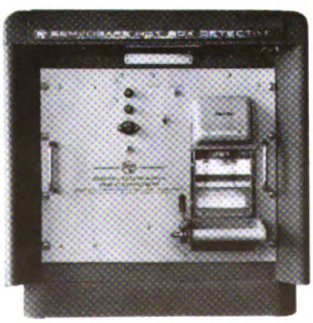
Inspectors on roads equipped with SERVOSAFE® Hot Box Detective systems *know* when a journal is running hot. They are informed of its location, even before the train reaches the yard. When the train pulls to a stop, inspectors concentrate their attention on the "suspects"...take corrective action *before* damage occurs. And chances of a faulty bearing leaving the yard, with burnoff and derailment a possible consequence, are reduced to an absolute minimum.

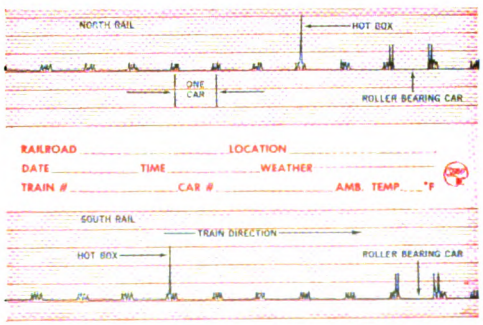
Servo hotbox specialists will gladly study your requirements. Why not get together with them soon and blueprint your own selective maintenance program.

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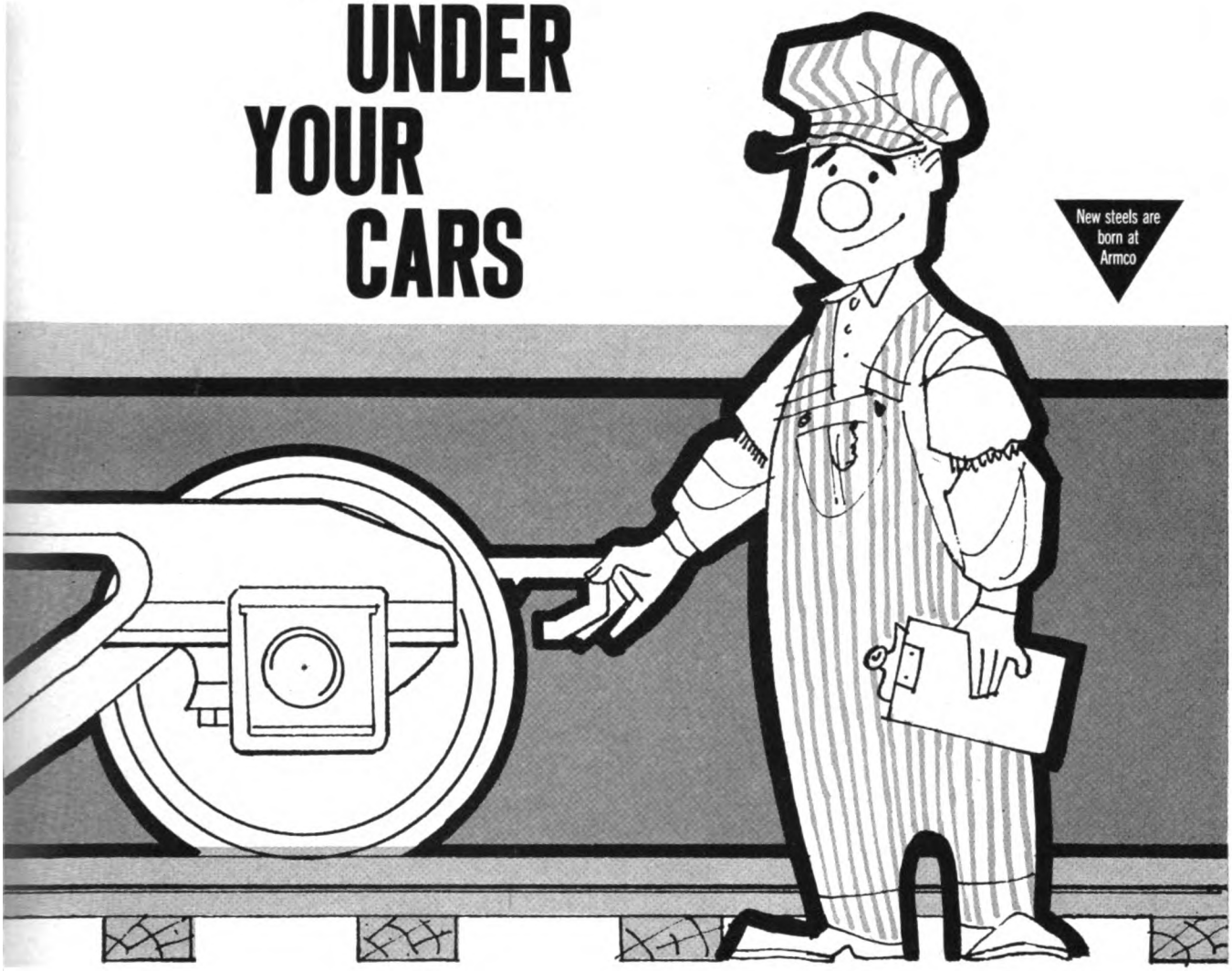
**Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857, and 2,963,575. Other U.S. and foreign patents pending.*





SERVOSAFE® Hot Box Detective* systems inspect all passing journals of incoming trains . . . furnish yard crews with advance information on hotbox locations for reliable, economical selective maintenance.

LOOK UNDER YOUR CARS



Dates stamped on the back of Armco One-Wear Wrought Steel Wheels show that many have given sturdy service for at least 15 years—some twice as long. Such durability isn't an exception, it's the rule with Armco Wrought Wheels. They're **forged** and **rolled** under tremendous pressure to work strength and safety in.

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A quick check with a gage will show there are thousands of rail miles left on those Armco Wheels. More than 50 years of wheel-making knowledge now combine with efficient modern manufacturing to offer you that kind of performance in the future.

Steel

Symbol of strength, safety, dependability

Want more information about long-wearing Armco Wrought Steel Wheels? Just call your nearby Armco Sales Office or write **Armco Division, Armco Steel Corporation, 1572 Curtis Street, Middletown, Ohio.**

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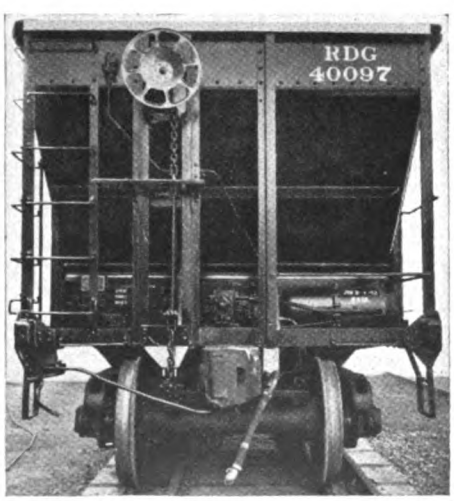


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400 new 85-ton hopper cars for the Reading



ROLLER BEARINGS, COMPOSITION BRAKE SHOES FEATURED IN CARS FOR ORE SERVICE

Here are the first of an order of 400 giant 85-ton hopper cars delivered to the Reading from Bethlehem's Johnstown, Pa., car shops. Designed as general service cars, they will also see extensive service hauling iron-ore pellets.

The cars feature roller bearings, composition brake shoes, automatic slack adjusters, and high-capacity draft gears. Many features of the so-called "Committee-type" hoppers (ARR Alternate Standard) are included in these new cars.

Bethlehem is well-equipped to work with you on designs for either special or standard cars. Let's discuss your needs.

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August, 1962—Vol. 136, No. 8

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REPORT FOR AUGUST

ARSA-REMSA Merger Produces New Supply Group

Two railway supply groups have merged to form a single organization, the Railway Supply Association. The former Allied Railway Supply Association, which has served the Coordinated Associations, and the Railway Electrical and Mechanical Supply Association, which has served the Mechanical Division of the Association of American Railroads, originally its Electrical Section, joined forces on June 28 at the conclusion of the annual AAR meeting.

The new 300-member organization will hold exhibits and perform other services in conjunction with meetings of the AAR Mechanical Division, which normally meets in June, and for the Coordinated groups, which usually meet in September. The frequency of equipment exhibits has been reduced in recent years. Next such exhibition, to be held jointly with track, structure, signalling and communication suppliers, is scheduled for October 1963 at McCormick Place in Chicago. At that time the Coordinated groups and the Mechanical Division will hold meetings simultaneously with other AAR divisions and railway associations.

This year's meeting of the Coordinated Associations—the Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations—will be held at the Sherman House on September 17, 18 and 19, 1962 (RL&C, July 1962, p. 5).

ASTM Meeting To Have Railroad Symposium

A Railroad Symposium will be part of the program for the Pacific Area National Meeting of the American Society for Testing and Materials. Scheduled for Los Angeles on Oct. 5, 1962, this railroad session will include: Automated Systems to Facilitate Cleaning and Shopping of Diesel Engines and Other Railroad Equipment by F. H. Stengele and E. Lenzin, Southern Pacific; Research and Rail Inspection by R. MacBrian, Denver & Rio Grande Western; Field Testing Experience with Freight Car Journal Lubricators by M. A. Pinney, Pennsylvania; Lubricating Oil Oxidation Stability Test by R. H. Wright, New York Central; and Functions and Design of a Research and Control Facility for Railroad Diesel Locomotives by E. R. Thomas, Southern Pacific.

AAR Studies Lube Oil Problems

The Committee on Locomotives and Locomotive Fuels and Lubricants of the AAR Mechanical Division consistently works to improve diesel engine operation. An important phase of this is the lubricating oils which these engines use.

A project to determine the characteristics of different crankcase lubricating oils in various engines under a variety of operating conditions is being progressed in two simultaneous programs. The first is being carried on by the railroads through the Committee on Locomotives and Locomotive Fuels and Lubricants as project LC-180. The second is being conducted by the Coordinating Research Council as project CD-5-58, with the cooperation of the oil and engine industries and the military.

In the AAR phase, full-scale field-service tests have been completed on five lubricating oils involving different additives and base stocks. The results of four tests have been published by the AAR as reports OR-9 through OR-12. Tests were made under procedures set up by AAR Test Manual MR-305. They are the first made by the railroads to produce data on engine wear, deposits and piston ring breakage which could be compared. Tests show that a wider range of lubricating oils might be acceptable for railroad engines.

The working group of the CRC council, headed by M. A. Pinney, PRR engineer of

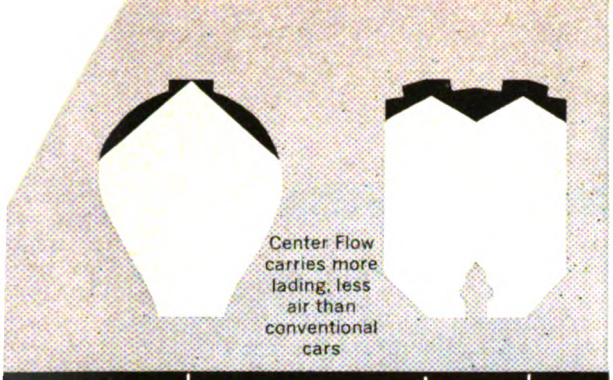
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TIME SAVING IDEAS FOR AUGUST

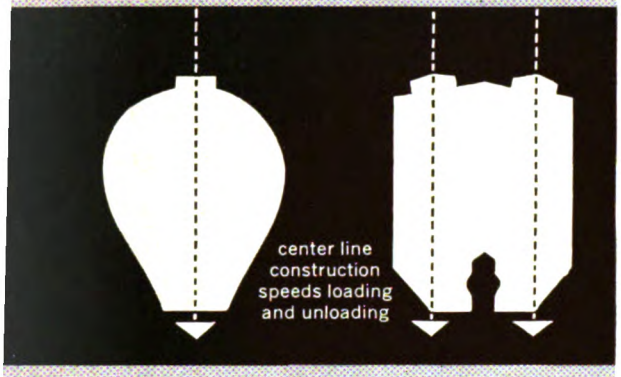
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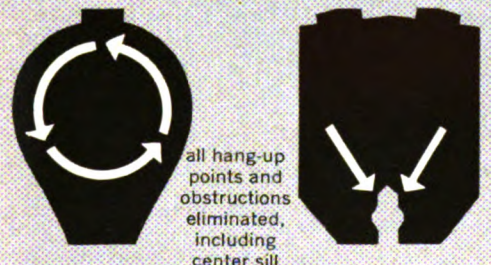
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Center Flow carries more lading, less air than conventional cars



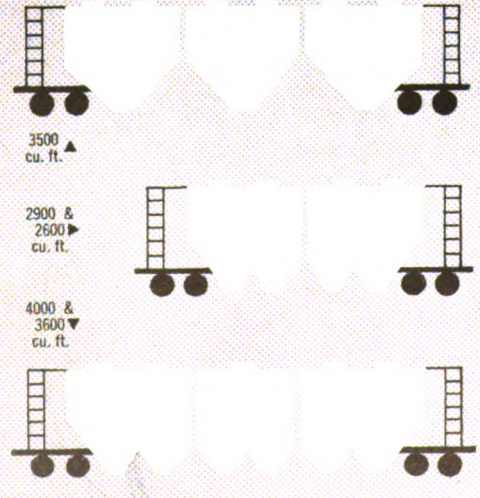
center line construction speeds loading and unloading



all hang-up points and obstructions eliminated, including center sill



carries a variety of ladings without contamination



modular construction permits Center Flow to be manufactured in different capacities.

REVOLUTIONARY NEW

CENTER FLOW

BULK MATERIAL CAR LOADS AND UNLOADS FASTER, CLEANER, EASIER

ACF's new Center Flow can carry a wide variety of ladings, including plastic pellets, chemicals and foods such as flour, malt and other grains. Its clean interior, free from sharp angles and ledges, speeds loading and also facilitates quick discharge with either gravity or pneumatic outlet. The Center Flow's design versatility enables it to be manufactured in different capacities to provide the most economical transport of commodities of varying density. A further design advantage lies in the fact that the number of unloading hookups can be tailored to meet individual requirements.



FOLLOWING ARE SOME OF THE FEATURES WHICH POINT UP THE ADVANTAGES OF THIS REVOLUTIONARY CAR:

LOADING

- Center line hatch arrangement allows for faster, easier loading.
- Light weight increases payload.
- More effective use of cubage.

UNLOADING

- Center line unloading.
- 50° slope angle allows faster unloading.
- Either pneumatic or gravity outlet.
- Single or double outlet per compartment as desired.

CONSTRUCTION

- Manufactured in aluminum or steel.
- Fewer hatches.
- Elimination of center sill.
- Elimination of side stakes, and carlines.
- Lower center of gravity.

CONTAMINATION-FREE

- Ease in lining preparation.
- "Clean Bore" design—self cleaning.
- Easier clean-out or flush-out.
- Individual compartments.
- Gasketed hatches with screw-down covers when required.



The revolutionary new Center Flow is the most advanced bulk material car ever built. Manufactured in either aluminum or steel, its large capacity enables it to carry bigger payloads than any bulk material car now on the rails, while its clean bore design and center line construction assure quick, clean and easy loading and unloading of dry bulk commodities.

Write for new brochure describing the many advantages the Center Flow bulk material car can offer your organization.

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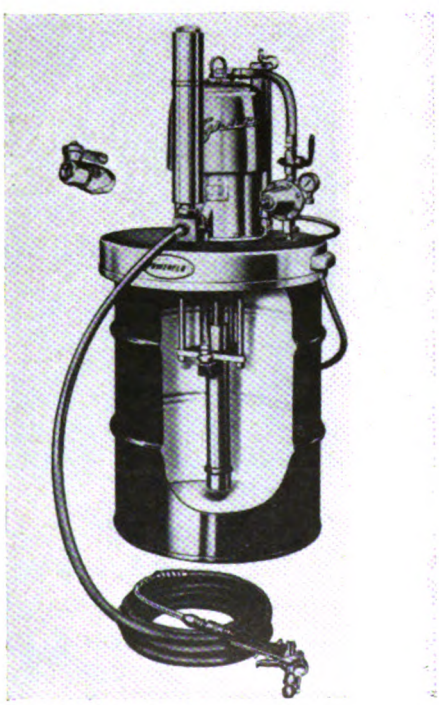
ACF INDUSTRIES



Draft Gear

Revised metallurgy and a metallic lubrication system are said to add sturdiness to the Miner RF-361 rubber friction draft gear for 24⅝-in. pocket. As tested under AAR Specification M-901E-59, the gear has an official capacity of 41,400 ft-lb at rated travel. After AAR sturdiness test, it had an official capacity of 53,800 ft-lb at rated travel and 61,700 ft-lb at maximum travel. The gear has received AAR Certificate No. 43. W. H. Miner, Inc.

For more information, circle 8-1 on coupon on page 48.



Airless System

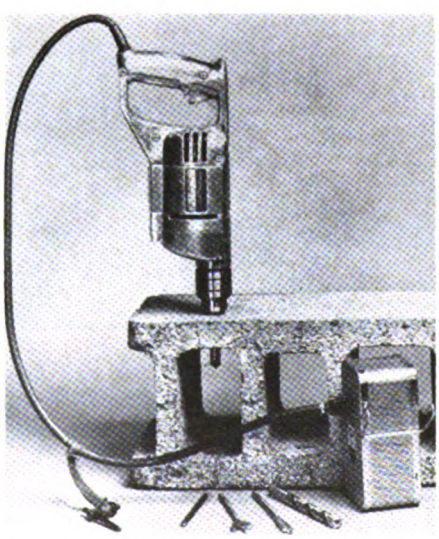
The Hydra-Mastic system for the spray application of heavy material protective coatings eliminates the atomizing air hose for improved speed, ease, and uniform application of heavy material spray. The units pressure-spray plastisols, asphalt, and petroleum base coatings; sound deadeners, sealers, and other protective coatings. An air-operated 30:1 ratio Bulldog pump pumps the material direct from 55-gal drums. The unit also has an air-powered elevator for easy drum changing; 25 ft delivery hose, and a special spray gun. A "Reverse-a-Clean," a device (upper left) which employs a reversible ball tip for removing obstructions without dismantling the gun, is also available for use with the Hydra-Mastic unit. With Reverse-a-Clean, when clogging occurs, twisting the external lever on the gun 180 deg and triggering the gun quickly forces loose any obstructions. Gray Company, Inc.

For more information, circle 8-2 on coupon on page 48.

Flange Cutter

The New Improved series FCC carbide flange cutters are said to be easier to transport and handle because the brake shoe is made of cast steel instead of cast iron. The cutter is free floating. It is put in place after the body of the tool has been installed and the abrasive pad has been added. The conventional brake shoe is removed and replaced with the cutter body. In a matter of minutes the locomotive is ready to start reducing the high flange. The operation, for which two men are needed, can be done at locomotive terminal. Wheel Truing Brake Shoe Co.

For more information, circle 8-3 on coupon on page 48.



Battery-Powered Drills

A separate plug-in power source—a rechargeable, 10-volt, nickel-cadmium power pack—generates power to operate the Rockwell battery-powered drills which are no larger and no heavier than conventional portable electric drills. The power pack can be hooked out of the way on the operator's belt or slung over his shoulder in a special carrying case. The tool can be used in remote areas for heavy duty drilling of wood, plywood, steel, aluminum, plastic laminates, etc. It has a net weight of 5 lb and is available in 18 models—¼ in., ⅜ in., and ½ in. units equipped with spade or pistol handle and rated at 1,500, 1,000 and 750 rpm. Rockwell Manufacturing Co.

For more information, circle 8-4 on coupon on page 48.



Caboose Heater

The Caban Junior caboose heater features radiant and convective heat, balanced draft control and a shock resistant fuel valve. Special tie-down bolts hold the unit against impact and shock. The heater has an output of 35,000 Btu and operates on diesel oil, kerosene, or No. 1 fuel oil. The unit can also be used for heating small buildings. Vapor Corp.

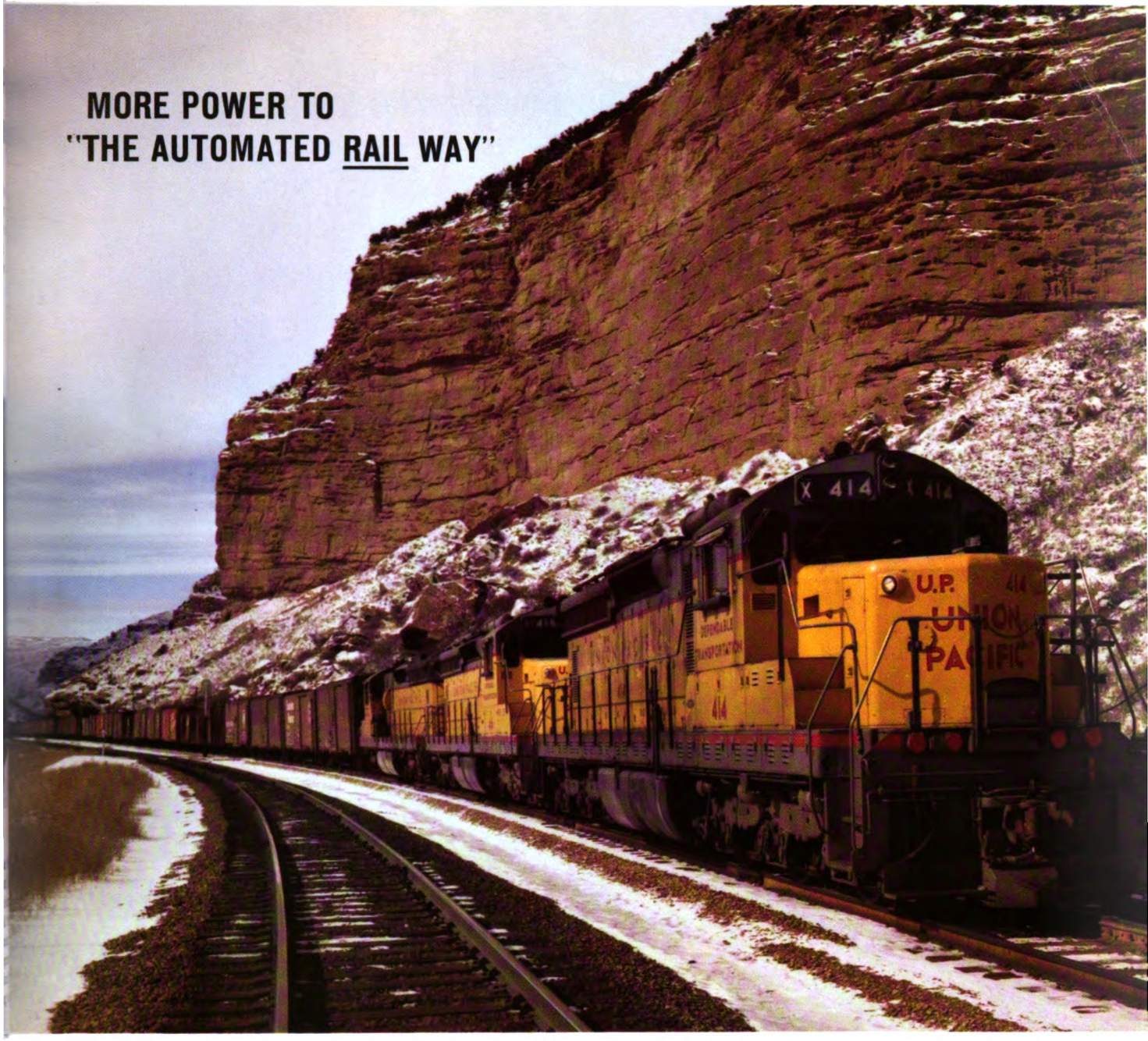
For more information, circle 8-5 on coupon on page 48.



Wide-Axle Crane

A wide rear axle, now optional to the standard "tricycle" unit, is said to increase over-the-side lifting capacity for the Austin-Western 3- to 5-ton Model 110 crane by up to 95%, depending on the distance from

(Continued on page 11)



UNION PACIFIC

A NATIONAL BRUSH USER FOR 25 YEARS

The Union Pacific's 10,000-mile system covers a vast region of great productivity and spectacular scenery.

Operating under varying conditions of desert heat, low humidity, and Rocky Mountain grades, Union Pacific's traction motors and main generators use "National" brushes for reliable commutation with minimum commutator maintenance.

From its initial use of "National" brushes over 25 years ago, the system now has them on many of its diesels... to provide power for speedy Domeliners and 100-car freight trains... to assure maximum performance hour after hour.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes.

This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact

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NATIONAL CARBON COMPANY

AMERICA'S FIRST 100% DIESELIZED SYSTEM...



GULF, MOBILE & OHIO

DEPENDS 100% ON NATIONAL BRUSHES

TRADE MARK

When the GM&O purchased their first diesel electric locomotive units 27 years ago, they began using "National" brushes. By 1949, the system was completely dieselized, with these brushes on over half the equipment. Because of proven maintenance savings and reliability, "National" brushes are now used on *all* road power traction motors and main generators.

Today, the GM&O operates over 250 diesels on its important link between the Great Lakes and the Gulf. Providing this efficient motive power fleet with dependable commutation and minimum commutator maintenance the year 'round is the vital job of "National" brushes.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact Mr. National Carbon

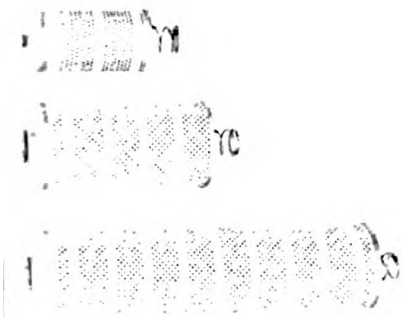
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NATIONAL CARBON COMPANY

(Continued from page 8)

e to hook. The assembly, a heavy steel, ctangular weldment, can be factory in- alled on new units, or supplied for field in- allation on cranes already at work. The andard unit's turning radius of 13 ft 6 in. increased by only 7 ft. Safe lifts at 90 deg f the side are 10,000 lb at 6-ft working dius; 3,000 lb at 18-ft radius. Both ratings e at 85% of tipping. Baldwin-Lima-amilton Corp.

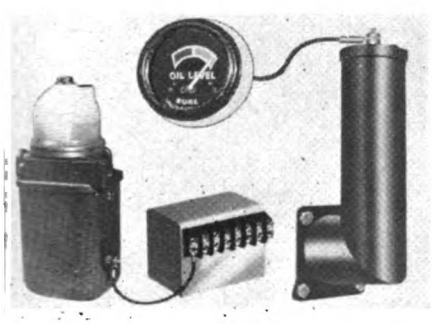
For more information, circle 8-6 on coupon on page 48.



ilter Cartridges

special Porosite filtrant is featured in ree new fuel-filter cartridges for locomo- ves. These cartridges, according to the anufacturer, cut the eleven steps required change a conventional cotton sock car- idge to just four operations—opening of e filter case; removal of the old cartridge; stallation of the new cartridge, and closing filter case. No filter basket is required, its cleaning is eliminated; time between ter change is extended, and there is no oil ag-out. The cartridges are individually ckaged in polyethylene bags. Wix Corp.

For more information, circle 8-7 on coupon on page 48.



Oil Level Gauge

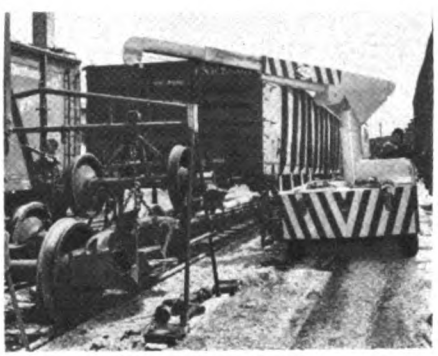
he Sure Oil level gauge is a direct reading auge which installs without engine changes, ther than minor drilling and wiring, at a w position on any crankcase or reservoir f any size. The meter is activated by any w voltage source. The Sure automatic oil efiller, is a companion unit, but can be used eparately. It keeps oil up to the proper level hile the engine is running regardless of ossible leakage or abnormal consumption. A small reservoir of any size, kept full, provides the reserve oil. The unit functions automatically to maintain oil level with a red flasher indicating when oil is being added. Sure Gauge & Lock Co.

For more information, circle 8-8 on coupon on page 48.

Mercury Lamps

A metallic reflector is built into the bulbs of a line of beam-controlled mercury vapor lamps presently available in 400-watt R60-bulb and 1,000-watt R80-bulb sizes. These Kleen-Beam lamps are said to have a useful life of 12,000 to 15,000 hr compared to 750 hr for a standard inside frost incandescent lamp. All useful light is projected out of the front of the bulb; no external reflector is required, and fixture construction has been simplified. The electrode of a Lifeguard arc tube, which is secured to the base of the lamp and to the top of the bulb, is said to reduce blackening of the tube, providing over 25% additional light throughout the 12,000-hr useful life of the lamp as compared with arc tubes of previous design. The lamps are also said to have a rating of over 70% longer useful life compared to previous type lamps. Westinghouse Electric Corp.

For more information, circle 8-9 on coupon on page 48.



Low-Profile Crane

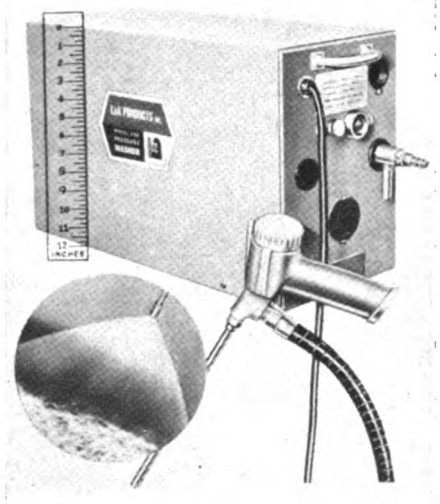
Power steering and torque converter drive feature the Drott 60RME low-profile Go-Devil crane. The crane has an all-steel, welded box-section frame and a carry-deck area of 50 sq ft. It is said to handle, transport, and position loads up to 6,000 lb with a three-part, 360-deg continuous swing boom which retracts to 6 ft and extends to 16 ft. Speeds range from 5 to 19 mph. Cranes with either a 45-hp diesel or gasoline engine are available. Drott Mfg. Corp.

For more information, circle 8-10 on coupon on page 48.

Urethane Rubber Products

Components tailored to specific shock and sound-absorbing requirements can be produced using specially compounded urethane elastomers instead of standard materials. Included are load-bearing devices with much greater capacity than thei sors of the same size, and gear uate shock and noise. Balance of p is achieved by custom compounding o four basic types of urethanes—castable o liquid, thermoplastic resin, semi-cure thermo-setting, and millable gum. Parts can be held within close limits, with dimensional tolerances within plus or minus .001 in. per in. without grinding. Properties, it is said, can be maintained over a wide temperature range. Lord Manufacturing Co.

For more information, circle 8-11 on coupon on page 48.



Pressure Washer

The Model 202 self-contained washer, with its high-pressure, 500-psi spray, is adaptable for cleaning equipment interiors and exteriors; for washing passenger and freight loading areas, or for clean-up jobs around other railroad installations. The washer is connected to a tap-water source, hot or cold, and applies water, detergents, soaps, or cleaning solvents, either concentrated or diluted. The unit, which can be drum-mounted or used on a work bench, shelf or creeper stand, develops its own pressure. Centrally placed, it works within a circle of about 200 ft without moving the cabinet. The aluminum pistol-grip washing wand is dial controlled. The control circuit is 24 volts. L & A Products, Inc.

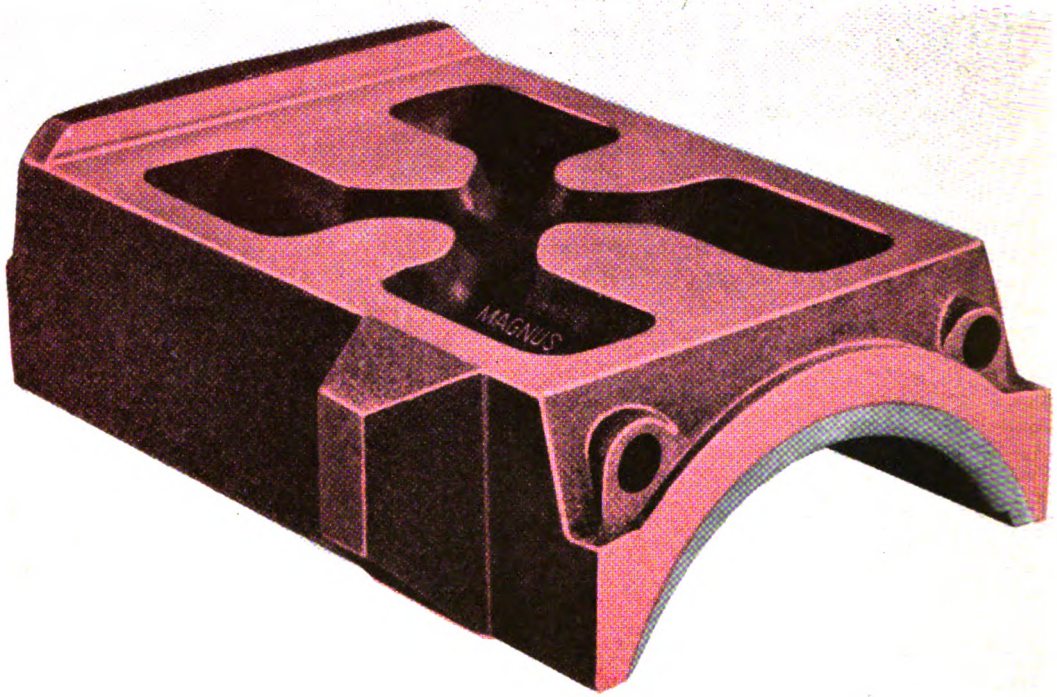
For more information, circle 8-12 on coupon on page 48.

Car Cement

Milar smooth car cement, a coating which, according to the manufacturer, has been tested with favorable results by several railroads, can be applied by an air-driven surge pump and mastic spray gun, or airless spray equipment. It is said to withstand sledge hammer blows and vibration on hopper cars, gondolas, and ore cars. Coverage of 50 sq ft at 32 mils wet results in a film build-up of 15 mils dry. Drying time is about 6 hr. DeSoto Chemical Coatings, Inc.

For more information, circle 8-13 on coupon on page 48.

MAGNUS FLAT-BACK BEARINGS...



the LOW-COST way to stabilize journals and get still better freight car performance

Today, freight cars with lubricators average better than four times the performance with waste packing in 1954—and cost per car per year for journal bearing operation and maintenance has been cut more than half. Better still, total costs for *solid* bearings today are less than the fixed charges on the extra investment in roller-type bearings.

The next big step toward improved performance is the *flat-back bearing*—available from Magnus to AAR specification and design, in nominal and step-sizes. It effectively restricts fore-and-aft movement of the journal under all normal operating conditions—makes it possible for the bearing to remain seated on the journal and to provide uninterrupted lubrication.

Several leading railroads are applying flat-back bearings to all new standard interchange freight cars. One railroad is converting existing equipment to flat-backs at repack periods.

Flat-backs prevent excessive journal displacement—increase the efficiency and service life of present-day rear seals. They require no additional labor to install and, through improved performance, can quickly pay for the slight extra cost.



CURRENT ECONOMICS OF SOLID BEARING OPERATION

New economic study updates AAR Report 20,000 insofar as it covered solid bearing costs in 1954—shows how lubricators have cut these more than half despite increases in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, N. Y. or to 80 East Jackson Boulevard, Chicago 4, Ill.

MAGNUS
METAL CORPORATION
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EDITORIALS

Coordinated Meetings

Are you interested in the solution to your locomotive maintenance problem? Would you like to know more about servicing mechanical refrigeration equipment? Are you up-to-date on the 26-C brake valve in the 24RL air brake schedule? Would a discussion of loss and damage prevention help your railroad? If you are interested in these subjects and if you would like to know the answers then you should be at the Sherman House, Chicago, from Monday, September 17 through Wednesday, September 19.

You will get the answers to these questions and many more at the meetings of the four Coordinated Associations on those dates. The Air Brake, Car Department Officers, Locomotive Maintenance Officers and the Railway Fuel and Operating Officers associations have excellent programs to present at these meetings (RL&C, June, 1962, p 5). In addition to the set programs these associations also offer everyone in attendance the opportunity to get valuable help on specific problems from experienced men who are outstanding authorities in their fields.

We urge all mechanical department men to attend who can possibly do so because we believe the meetings to be worthwhile to the individual and of great value to the railroad he represents.

Being "Realistic"

The new depreciation rules that became effective on July 11 are sure to benefit the railroads. Of particular interest to mechanical department men is the 14-year term authorized for motive power, freight and passenger cars, and shop machinery.

In the past the depreciation rates for railroad equipment have been characterized as "unrealistic". The new allowable depreciation period is about what the railroad industry wanted as a "realistic" income-tax basis for writing off equipment subject to depreciation and obsolescence. The latter is especially significant because fast-moving technological developments have placed an out-of-date tag on a large part of both the motive power inventory and the car fleet. In the shops and servicing facilities the new rules should stimulate installation of available new tools and material-handling and servicing equipment that are essential if major savings are to be realized in maintenance and repair operations.

The new rules remove one important obstacle that has slowed the modernization of railroad plant and equipment. It is now up to each railroad to determine how it can best take advantage of the tax savings. We believe the new rules will spur the purchase of equipment the railroads need to improve their operating efficiency and competitive position in the transportation field. Certainly out-of-date depreciation rules can not be given as a reason for any further delay in stepping up the equipment replacement pace to a "realistic" rate that is in line with this need.

Still More To Do

Obtaining longer life from rotating electrical equipment on locomotives can have a marked effect on the costs of motive-power maintenance. Various approaches to the problems associated with lengthened service from traction motors are under investigation by the AAR Mechanical Division's Committee on Electrical Equipment—Rolling Stock. The report made by this group at the June meeting indicated that there are eleven different projects under investigation which could do much to extend the intervals between major motor overhauls.

The past decade has brought what the Committee calls "a revolution" in traction-motor repairs. Glass bands and epoxy-mica-glass insulating systems are given credit for playing major roles. The Committee believes, however, that much more can be done.

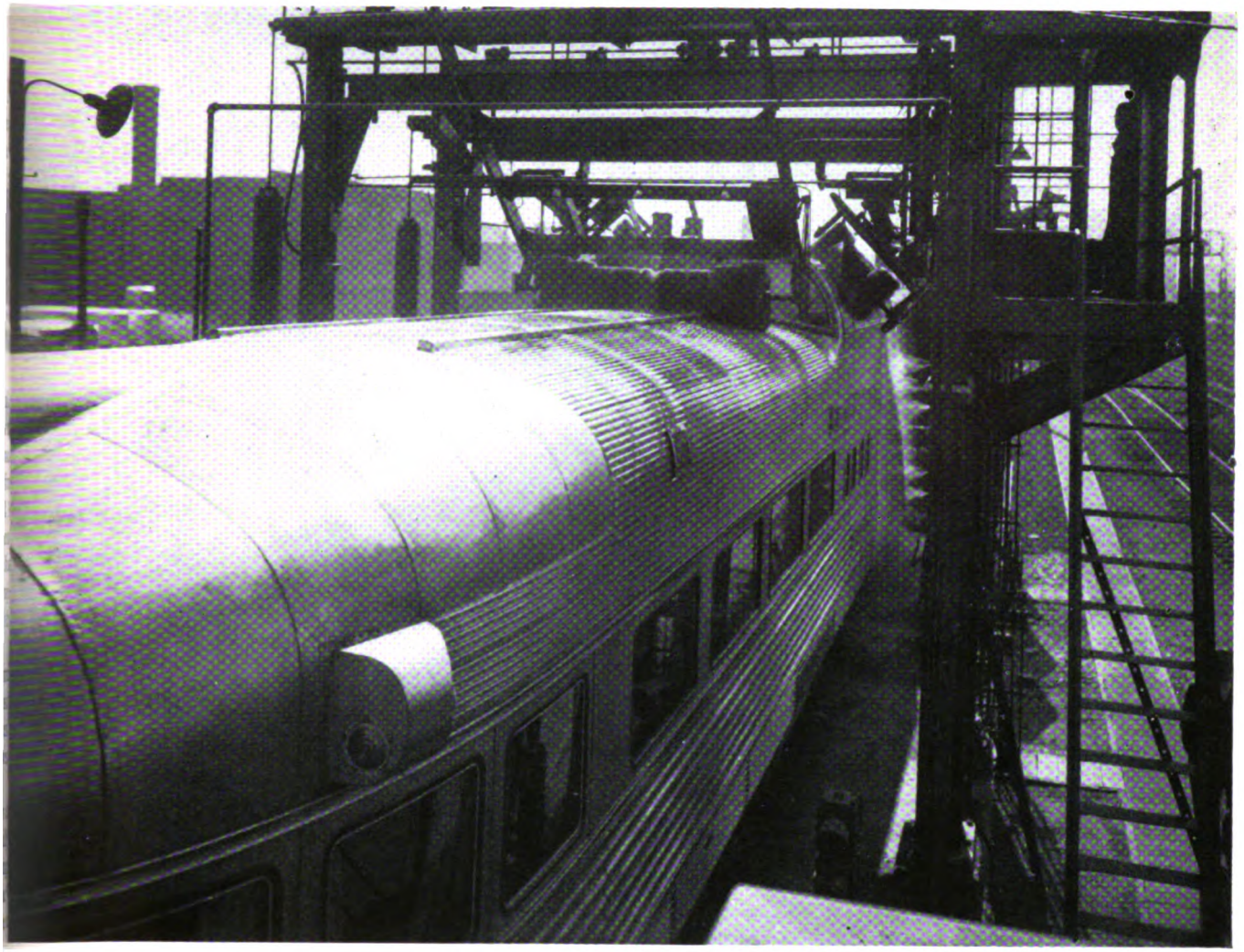
One topic now being studied is restoration of armature winding insulation which has been thermally aged by overheating; another is restoration of winding resistance which has been lowered by other factors. The Committee reports that aged or degraded windings can be restored by reuniting the mica components with epoxy resins. "Old armatures are no longer rewound unless metallic grounds are present," it was stated.

Another process being investigated is restoration of armatures damaged by armature bearing failures. Dragged core iron can be cleaned up and the armature may then be impregnated without rewinding. New methods are being tested for assuring that stators will perform satisfactorily in humid surroundings, that the motors on traction-motor blowers will withstand surges without distortion of windings, and that field coils will operate for longer periods without overhaul.

Solidification of loose core iron and loose commutators, as alternatives to complete armature rebuilding, are also under study. Going beyond areas that might be classified as "maintenance," the Committee is looking into the development of a riserless commutator and into the transfer of cross connectors to the pinion ends of certain armatures. While these are design changes, they could have an important effect on maintenance.

All these investigations indicate the refinements which ingenious railroaders and manufacturers can incorporate and utilize in what would seem to be an already highly developed device like the direct-current traction motor. Inevitably, there will be other changes which will render it an even longer-lived, lower-cost locomotive component.

Oakite adds more POWER to your MANPOWER



Oakite 88 + mechanical washer = MORE cars washed BETTER at LESS COST

Keeping solution tanks supplied with Oakite 88 is about all the manpower involved in washing cars more efficiently. With this soil-loosening, safe Oakite solution that packs more cleaning power to the ounce, the mechanical scrubber does the job with amazing thoroughness. Oil, grease, and crater dust disappear.

Here's how one terminal was convinced. Instead of their former material, they used a more dilute solution of Oakite 88. 125 cars were washed. Morning inspection revealed that each had dried down with *streak-free* sides and *sparkling* windows. And records showed that for each, the material consumed cost 75% less!

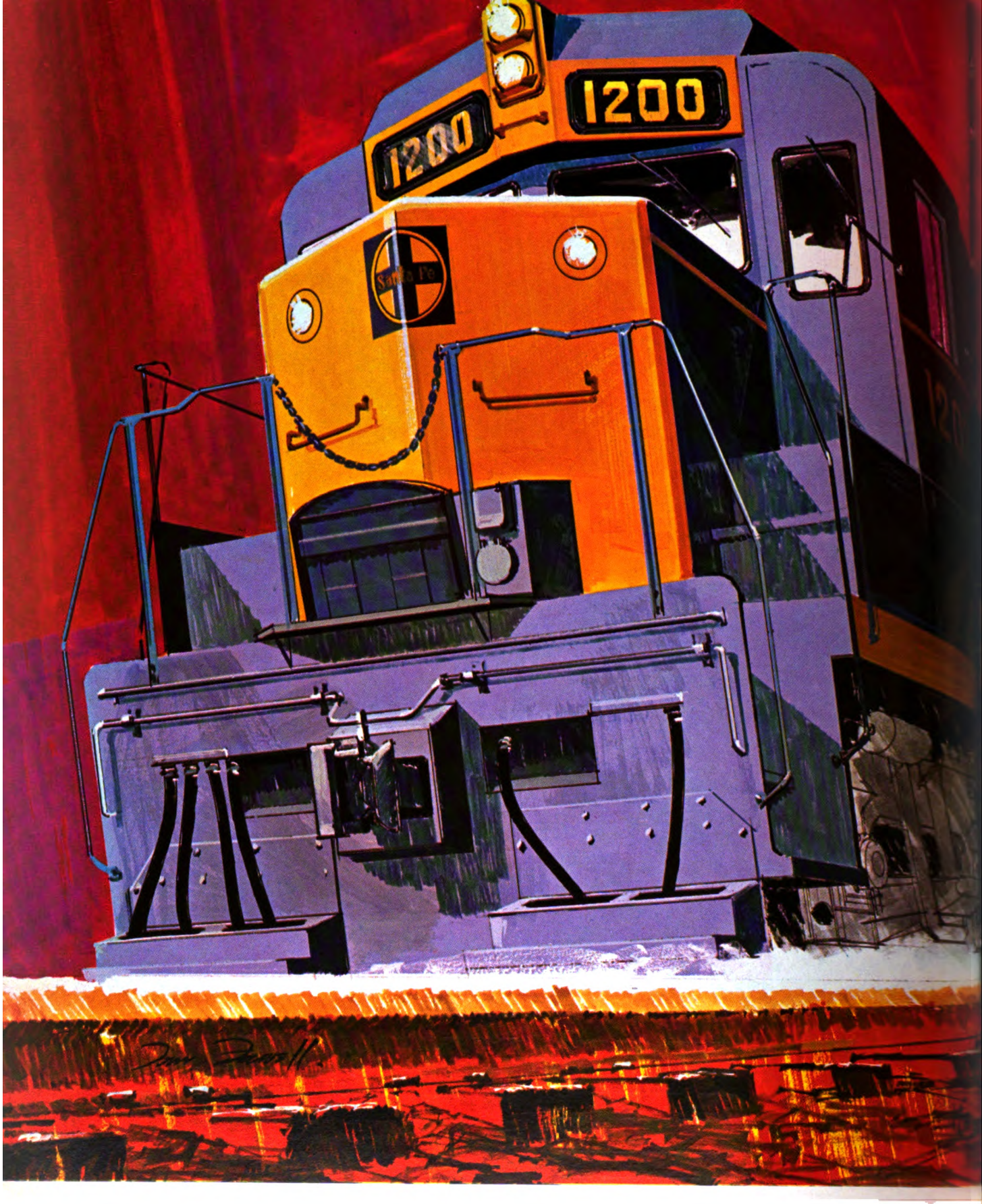
By boosting the cleaning power of your available manpower . . . by increasing cleaning efficiency of your maintenance equipment . . . Oakite gives you the important advantage: LOW-COST END RESULTS.

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years' leadership in industrial cleaning



On the Santa Fe . . .

the Revolutionary GP-30

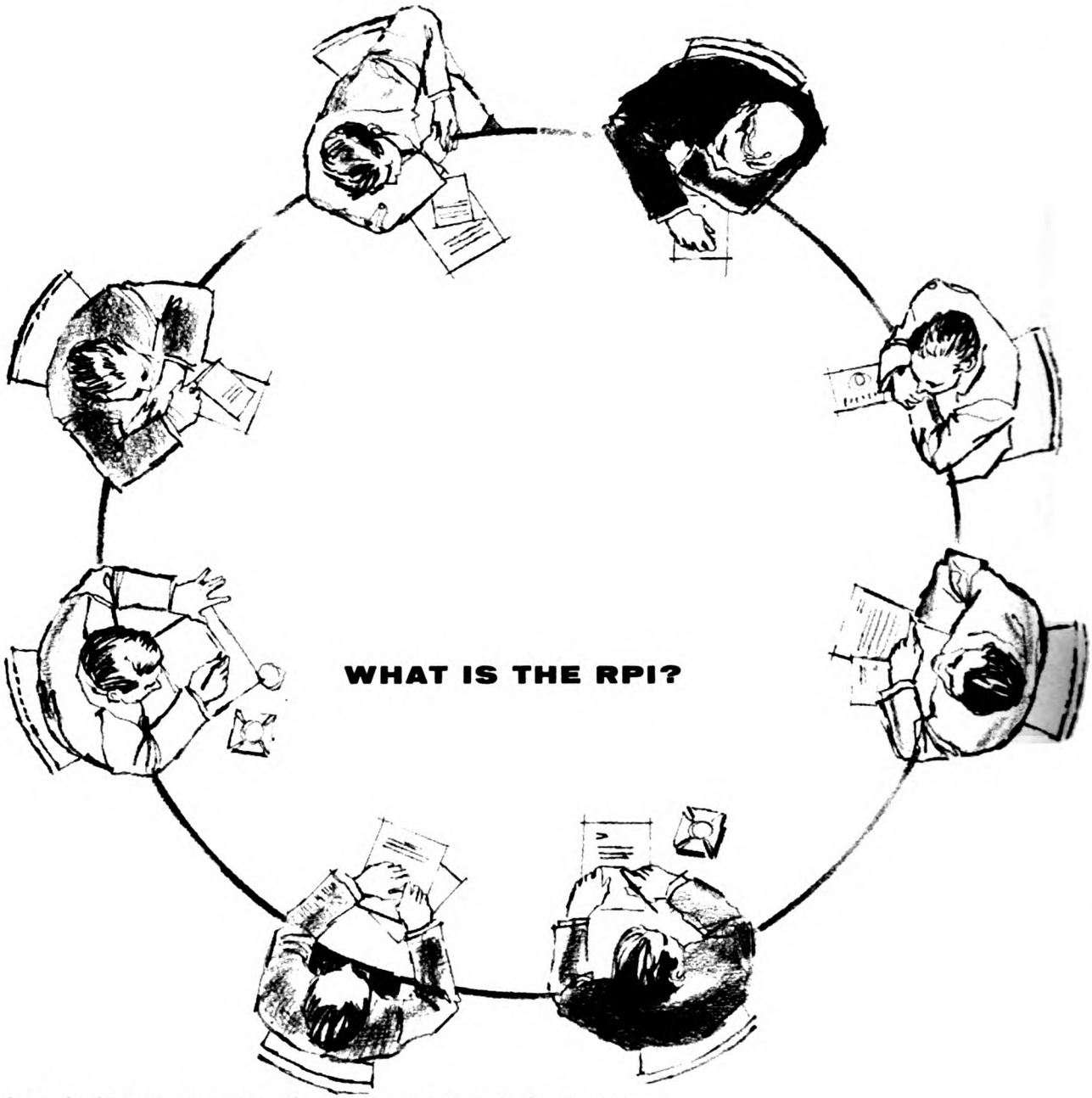


On the Santa Fe, thirty-five General Motors GP-30's speed freight between Chicago and destinations westward. The most significant advancement since Diesel first replaced steam, these new mainline pacesetters combine high speed/heavy drag performance . . . offer dramatic economies in operation and maintenance. For the Santa Fe the Revolutionary GP-30 represents railroad progress . . . the advantages of increased efficiency and earning power through planned locomotive replacement.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS · LA GRANGE, ILLINOIS

HOME OF THE DIESEL LOCOMOTIVE · In Canada: General Motors Diesel Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES



WHAT IS THE RPI?

Perhaps the best way to answer the question would be to describe the difference between a "railway supplier" and an "RPI railway supply man."

"RPI railway supply men" work together for the good of the *supply* industry. Through coordinated research and contributions of time and money, they gain closer understanding and better sales and service techniques for selling to the railroads.

One of the most effective ways *"RPI* railway supply men" work for the good of the supply industry is in working together for the good of the *railroad* industry. Their futures rise and fall together.

The "railway supplier" works by himself. He *may* work too, for the good of the railroads, but his is a lone voice.



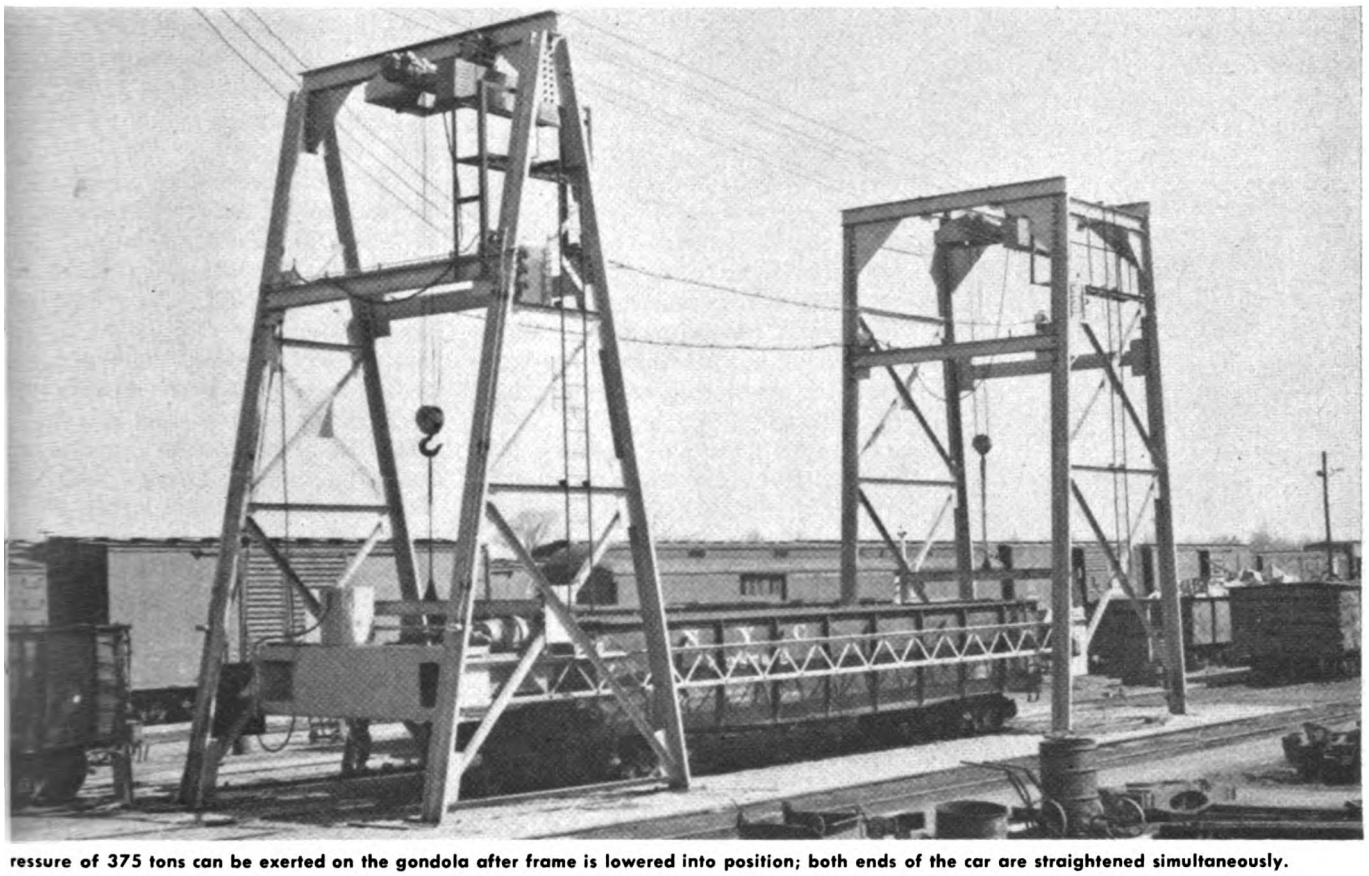
This, then, is the best way to answer the question in the headline.

Railway Progress INSTITUTE

38 South Dearborn Street • Chicago, Illinois

Behind this insignia is an "RPI railway supply man."

389



ressure of 375 tons can be exerted on the gondola after frame is lowered into position; both ends of the car are straightened simultaneously.

NYC Straightens Ends Hydraulically

High-capacity straightener has speeded repair of gondolas; device could be adapted for other cars

The New York Central has completed the installation and testing of a hydraulic car-end straightener which is now making a production-type operation out of what has previously been an expensive and time-consuming car-repair job. The new device, which can develop a maximum force of 375 tons, has been installed at the Central's car-repair facility at Ashtabula, Ohio. While capable of straightening the ends either of gondolas or box cars, the device is presently being used only for work on high-side, fixed-end gondola cars.

End straightening is a particularly acute problem with gondolas used primarily to handle steel-mill products. Shifting of billets, slabs, and structural shapes can, at times, force the ends of cars outward as much as 18 in. To improve the method of end straightening the idea of a frame completely surrounding the car was originated. By early 1961, Collinwood, Ohio, diesel shop had completed a simplified prototype which was then used for testing. It consisted of a rectangular frame supported by one of the overhead cranes in the backshop. It was powered by air jacks at one end and had simple dies in both ends. This unit showed the practicability of the arangement and led to the design of the unit which is now in regular service.

Study of the problem by car repair supervisors and the Mechanical Department's methods group set some general specifications for the design. The straightener was to be capable of removing the worst bulges from both ends of a car in an overall time of 10 min from the time the car was spotted in the device until the next car was ready for the same operation. It was desirable to remove as little of the hardware from the car ends as possible. The device should require only one operator. It should be capable of handling cars of varying lengths and of different types.

Further study of the problem led to the decision to install a unit at Ashtabula tailored specifically to the gondola operation. Ashtabula is located centrally between Cleveland, Buffalo, and Youngstown, all major steel centers, where demand for gondola cars is heavy. Study showed that 7,500 of

the 8,500 high-side gondolas on the railroad had the same type of Standard Railway Equipment end—the result of an extensive rebuilding program carried out about ten years ago. These are all 40-ft, 55-ton cars and were the ones most frequently shopped for end straightening. While preliminary designs for the end straightener would have accommodated both 40- and 50-ft cars, it was decided that the first unit would not be made adjustable and would fit only the 41-ft 3-in. overall length of the gondolas which represented the major immediate problem. To date, the device has been fitted with dies suitable only for gondola ends, but, with proper dies, it could also be used on 40-ft box cars.



Brake step, uncoupling lever and hand brake are removed before car enters straightener.

It was decided that a maximum force of 375 tons developed during a 3-min pressing cycle would be a conservative design figure. Because the end just above the end sill usually has the maximum distortion on gondolas, it seemed advisable to deliver the maximum force to this area. While the prototype unit had been air powered, the speeds and forces desired in the production model made almost inevitable the decision to adopt a hydraulic system.

Because of the long stroke—48 in. —required to remove distortion of up to 18 in. on each end of a car, it was found necessary to adopt an extra-capacity pumping unit for the five 75-ton cylinders used. The hydraulic system was manufactured by Parker-Hannifin Corp. The cylinders are P-H type HB-H-24, with 8-in. bore and 48-in. stroke. The power unit with a 50-hp motor and 100-gal oil reservoir is Model SP-4-46. The motor, higher powered than would normally be used with such a system, was utilized to deliver the volume of oil necessary to give the desired speed of operation. Fittings and lines are P-H Hozelok type. The intermittent rating of this actuating unit at 3,000 psi is 375 tons. At the continuous rating of 2,500 psi the unit delivers a force of 312.5 tons, and can press at the rate of 24 in. per min.

The five cylinders are mounted on the end rail of the straightener frame with three in the bottom row on 22-in. centers so they are about 22½ in. above a car's coupler centerline, and the remaining two cylinders 33 in. apart and 24 in. above the others. The pistons are bolted to the movable die which, like the fixed die, is actually a section of reinforced Dreadnaught end of the same type used on the gondolas involved. The movable die is mounted on rollers which move along guides on the side rails of the frame.

These side rails, designed to transmit the forces developed by the cylinders to the fixed die at the far end of the frame, are each lattice trusses formed by a pair of 3-x 3-x ½-in. angles with 6- x ½-in. cover plates



Complete hydraulic unit is mounted at one end of the device. Hoists were salvaged from steam locomotive shop; both are synchronized.



Die at non-powered end is pulled against car by side rails. Dies are made of gondola ends; both are notched to clear safety appliances.

lded along the horizontal legs. Each d rail is a section formed by two rizontal 24-in. I-beams with a ½-in. ver plate on the outer end. Welded ps join side and end rails.

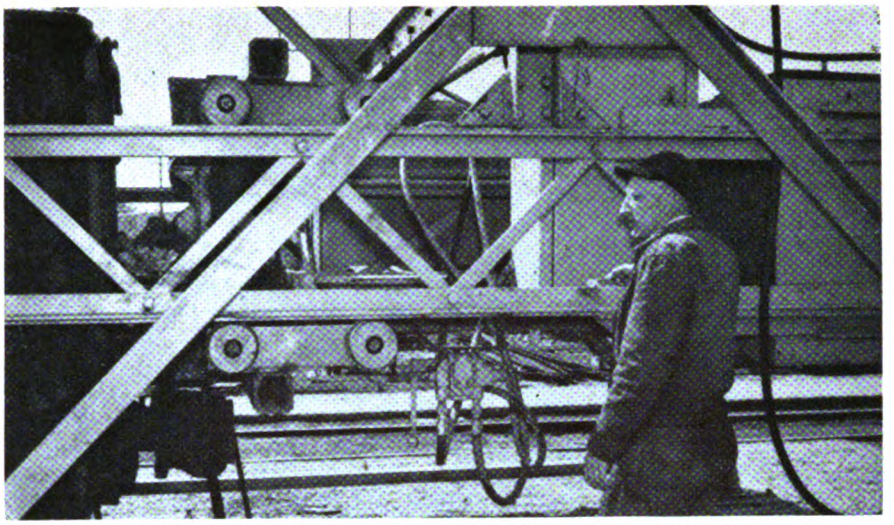
The entire straightener assembly, mplete with hydraulic actuator, ighs about 15 tons. It is raised and vered over cars by a pair of sychron-d 10-ton electric drop-table hoists ng from A-frame supports built of l. These frames span the track and e mounted on concrete footers.

From the beginning, it was realized at the straightening could not be done th all of a car's safety appliances in ace. Dies were designed, however, that a minimum of material would ed to be removed. The two dies are plicates so that it makes no differ-ce which way a car is headed when enters the device. The die is narrow ough so it does not contact the end dder or handhold on the other side the car end. Before the car enters e straightener, the complete hand ake and pull rod, the retainer valve d pipe, the brake step, and the upler operating rod are removed. his leaves the brake-step brackets, dders, and handholds in place. The ies clear all these details.

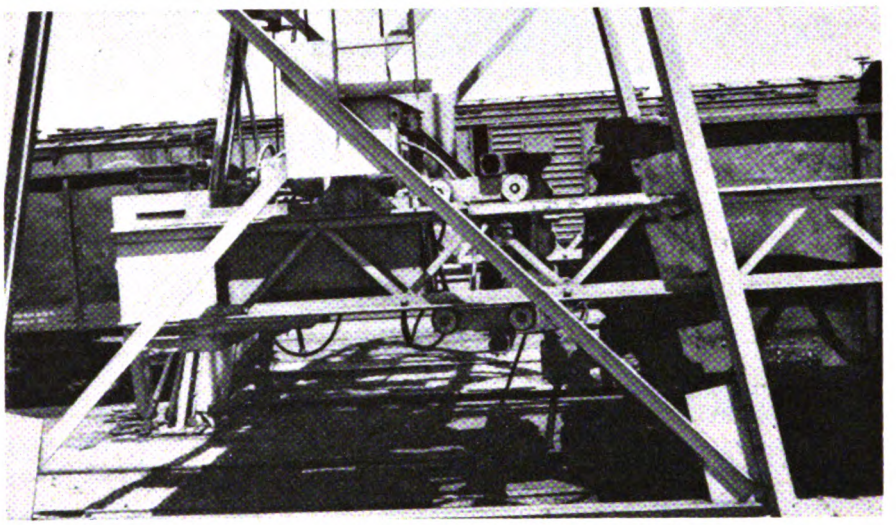
The car is moved into position with Trackmobile or car puller. The ame is lowered and dies aligned and rought into contact with the end cor-gations. The pressing cycle follows. he car is then moved out of the de-ice to the next position where the omponents removed are reinstalled nd the car stenciled to indicate ends ave been straightened.

Initially, there was some uncertain-y about cars which might have one nd bulged considerably more than he other, a condition frequently found n gondolas. In practice, however, it as found that once the end with less istortion had been brought back into osition, the force would all be deliv-red to the end not yet fully restored. The device cannot be used on drop-nd gondolas where the forces would e delivered to the hinges.

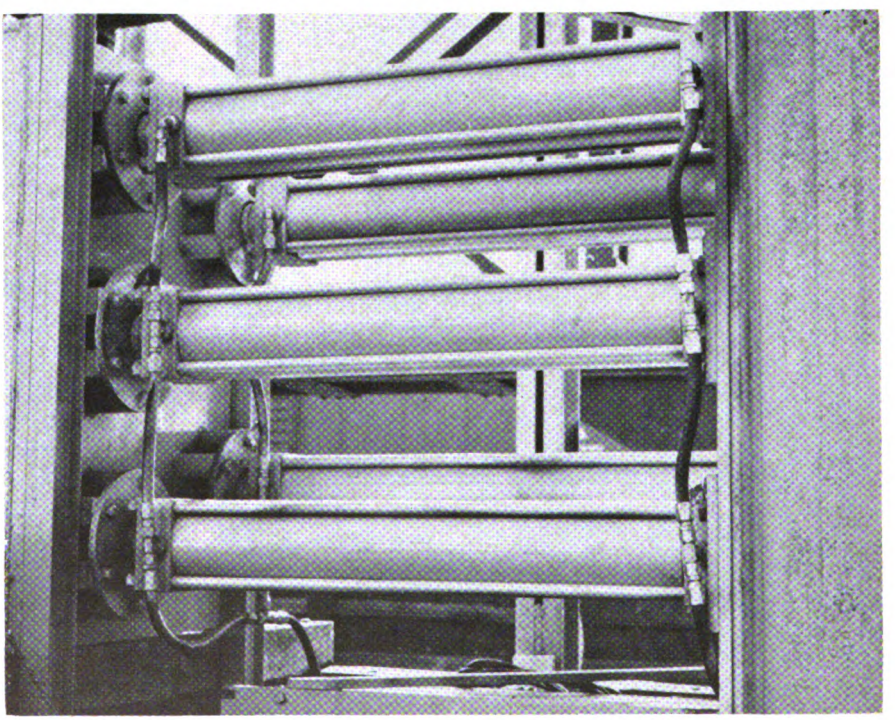
The NYC mechanical department as now completed the design for an adjustable frame which could be used on 40- and 50-ft cars, both gondolas and box cars. The unit in service has shown that it can reduce a two- to three-hour repair job to a matter of minutes. On this basis, it seems proba-ble that another straightener will be authorized shortly.



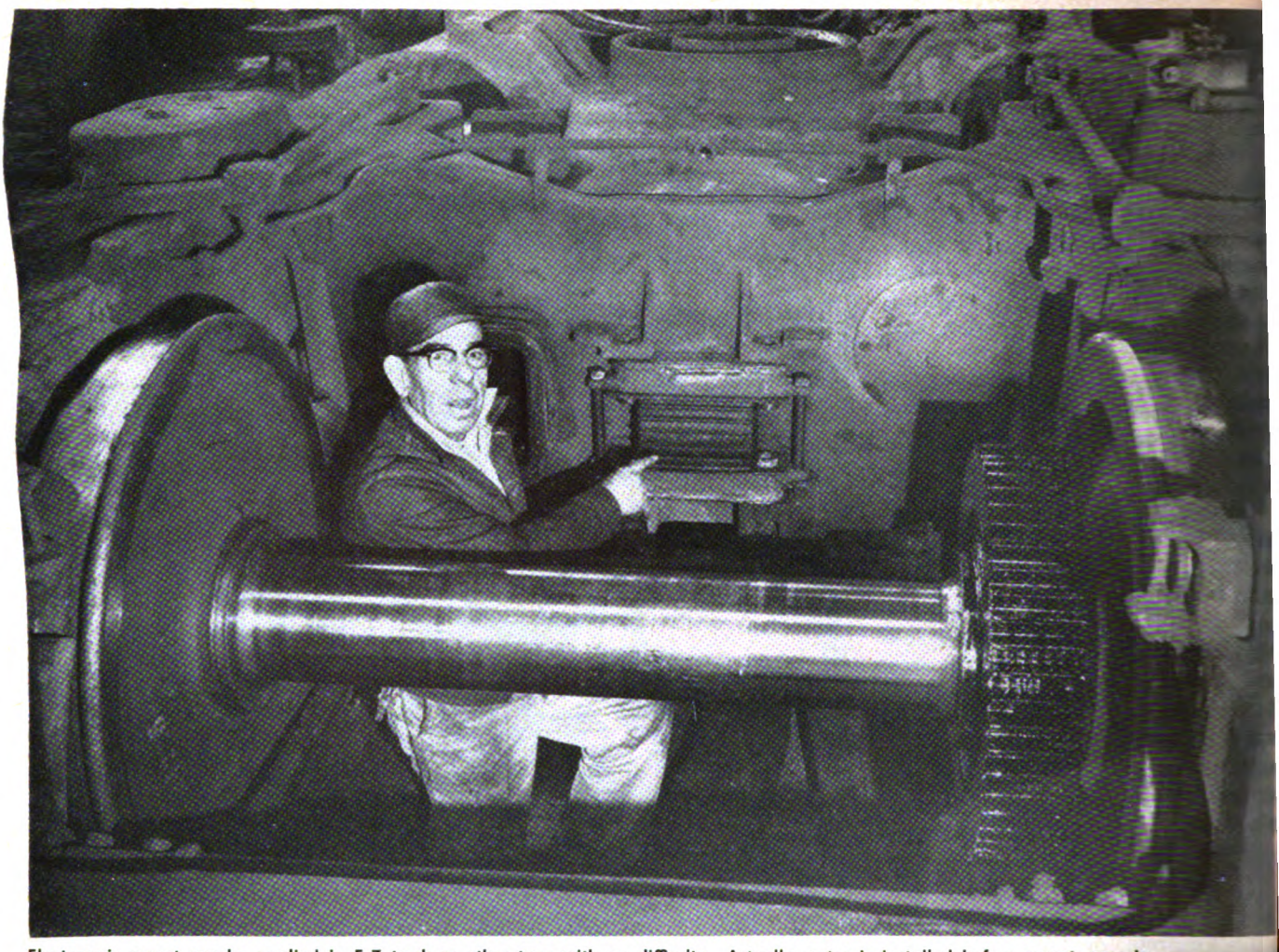
Controls for elevating straightener and operating hydraulic system are at one station.



Die is guided by wheels running along top and bottom of side rails as cylinders move it.



Hannifin hydraulic assembly consists of five 75-ton cylinders. Three cylinders bear against lower part of end; two against upper. Power unit is carried above cylinder assembly.



Elastomeric mount can be applied in E-7 truck or other type with no difficulty. Actually motor is installed before mount goes in.

MP Tests Rubber Nose Supports

Breakage and wear, two serious and completely distinct problems inherent in steel-spring traction-motor nose supports, are being overcome successfully by the Missouri Pacific. Installations of elastomeric motor mounts have been made on both road and switching locomotives. After several years of testing, the MP has found the Lord bonded-rubber mount to be a suitable replacement for the steel-spring unit.

Practically all U.S. locomotives have the so-called axle-mounting method for supporting traction motors in their trucks. This is a three-point suspension. Two points are the suspension bearings clamped around the axle and the third is the flexible arrangement between the motor and the truck frame. Because the motor would otherwise be free to rotate around its axle suspension bearings, it is the function of the nose suspension to accept the torque reaction of the motor.

Improper functioning of nose suspensions most frequently results in broken lugs on motors, slipped pinions, and occasional cracked pinions (See "Rubber Suspension Cuts Motor Impact," RL&C, May 1962, p. 18). Shock forces entering the motor through the nose suspension are known to have injurious effects on motor insulation and other components affected by vibration.

Not only do the bonded-rubber mounts provide more protection for drive components, the reduced tendency for locomotive slipping also improves operation.

Rubber mounts have, in some cases, now been in service on Missouri Pacific locomotives for over four years. Recent inspections, both on switching and road units, have shown the mounts to be in good condition. Some have operated for over 600,000 miles. Never has there been a case where re pair work on motors could be attribu ted to the rubber suspensions.

Breakage of motor lugs, the mos serious problem, occurs primarily i heavy-duty switching service. Sudde torque impulses and rebound are typ ical causes of high shock loads and en suing failure. Unless shocks are ab sorbed, lugs will be damaged. Th elastomeric units, unlike the conven tional steel mounts, have a non-linea deflection curve which means tha solid "bottoming" is impossible. Be cause of the linear characteristic of th steel-spring units, they may compres completely which then transmit shocks with no further cushioning.

During 1961 the MoPac experi enced 18 bottom-lug failures o switchers. Damage in each case wa $3,000 to $5,000. MP mechanica officers actually consider themselve rather fortunate because there were n

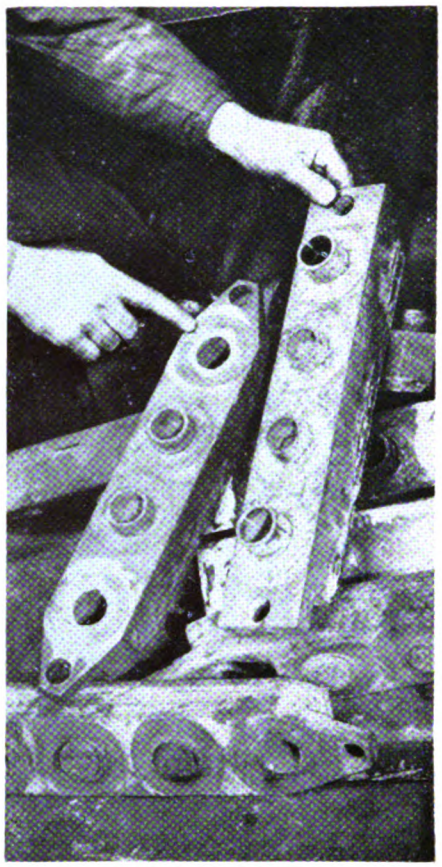
-lug failures. When a top lug
:aks, the motor can drop to the
ck, resulting in even greater dam-
:.

"Wear is the major problem with
unts on road power, both freight
l passenger," W. E. Robey, engi-
:r of electrical equipment and diesel
intenance, reports. "High speed,
nbined with heavy loads and ex-
ded periods of maximum torque—
:n high speed alone, can cause pow-
ul vibrations . . . The vibrations
ke the steel springs eat into the
ing holders, resulting in unwanted
y. The steel springs will also take
set,' which adds to the play."

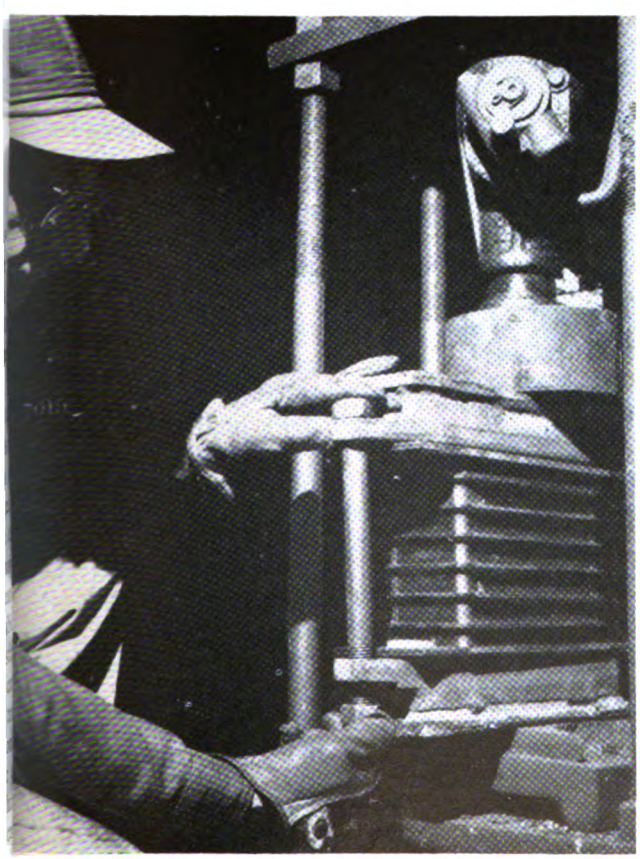
It has been found that the rubber
unt offers better control of the al-
vable free motion of the traction
tor, lowering costs of both truck
l motor maintenance. Initially some
? mechanical men were dubious
out the rubber-to-metal bond in the
rd units and of their ability to with-
nd the loads imposed by railroad
vice. Six months of testing con-
ced them that this was no problem;
er four years it has never developed.
In the course of the development,

(Continued on page 32)

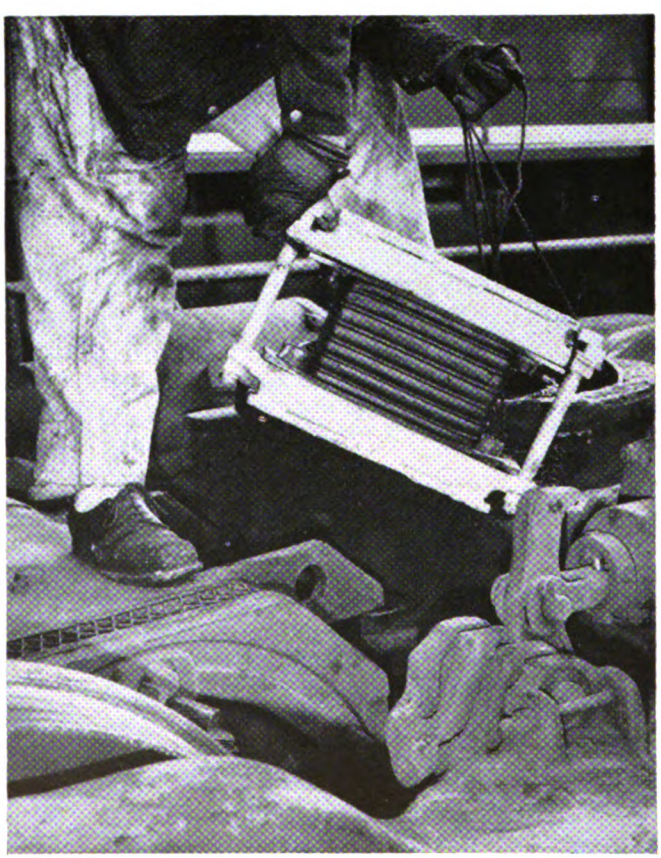




"Set" in of steel spring (left) has produced 9/16 in. of clearance in E-7 truck. Result can be uncushioned impacts which affect motors. Wear plates of steel-spring mounts (right) must be built up by welding at intervals because springs produce undue wear in operation.

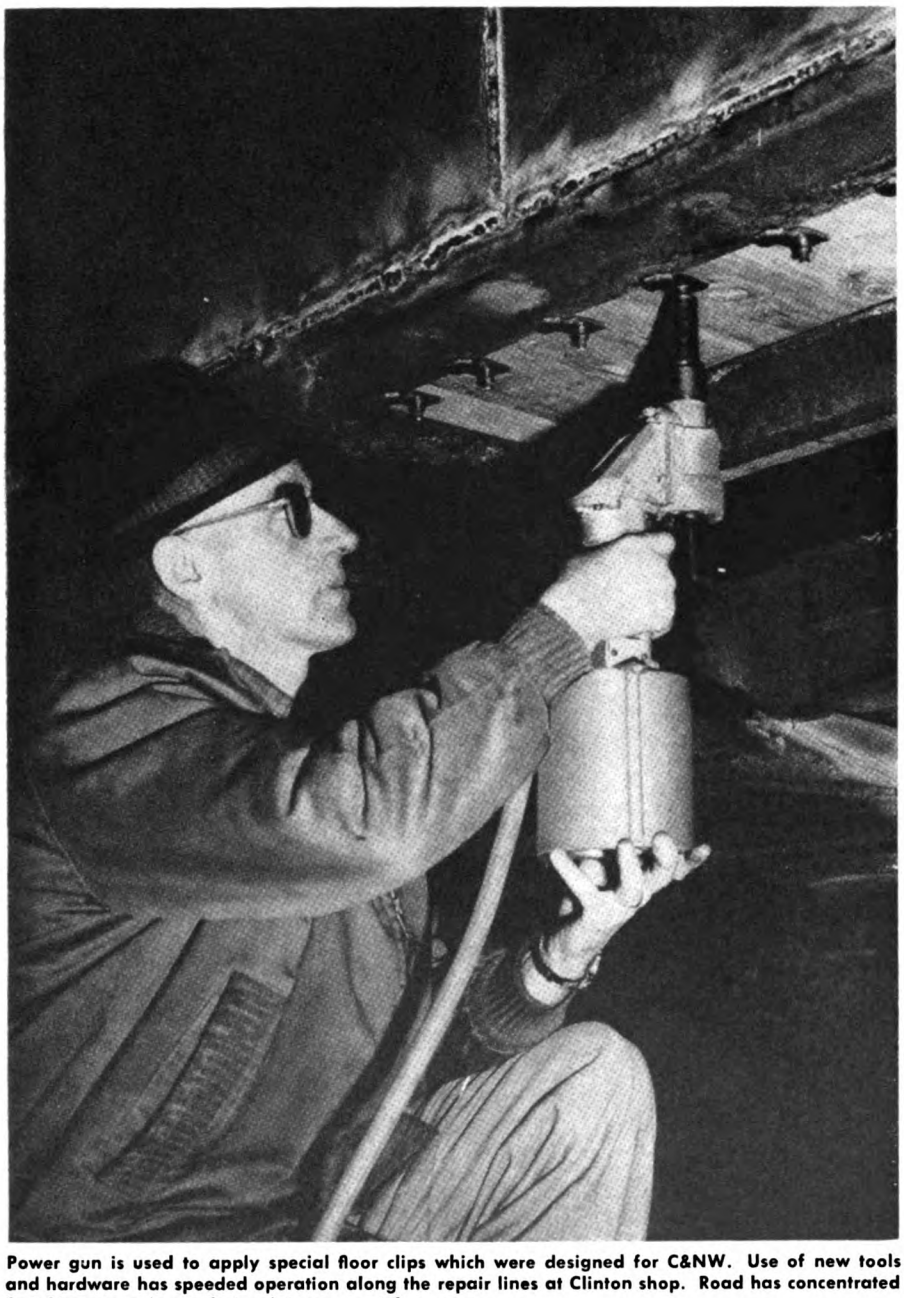


tor nose support mount is assembled with elastomeric unit which is mpressed so that spring holder and wear plate can be applied. Assembly and installation of these mounts have presented no problems for Missouri Pacific shops which have used them.



Rubber mount is lowered into Baldwin switcher truck. The substitution of these mounts can be done with no other alteration to the truck or motor. They have been used on various types of locomotives when steel springs required replacement.

Lockbolts Yield Car-Repair Savings



Power gun is used to apply special floor clips which were designed for C&NW. Use of new tools and hardware has speeded operation along the repair lines at Clinton shop. Road has concentrated freight car repairs at that point over past few years.

Car repair crews, using lockbolts and power guns, have achieved a 35% man-hour saving in fastening operations at the Chicago & North Western shop in Clinton, Iowa. There are no more hot-rivet gangs on the repair lines at Clinton where a continuing box car rebuilding and repair program is under way. C&NW is quick to point out the savings in man-hours, dollars and worker fatigue which have resulted since the old-style fastener methods have been superceded.

R. E. Powers, C&NW car shop superintendent at Clinton, says: "We're going full steam on the upgrading program, with some 1,500 cars scheduled for face lifting. Depending on the number of cars we handle each day, our man-hour saving in fastener application is from 20 to 40%. The C&NW is saving $3.50 per 1,000 installed fasteners over the old system."

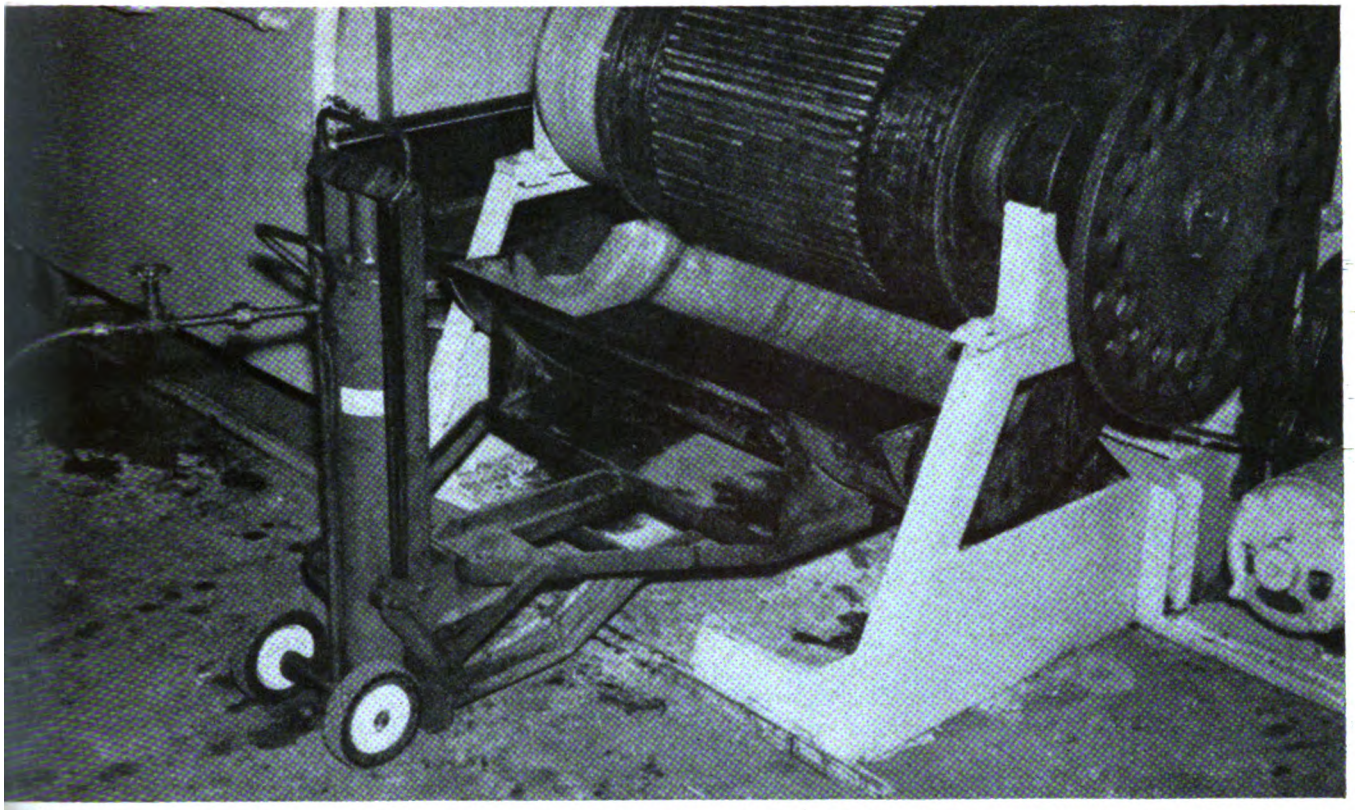
The program, designed to afford 10% faster installation with stronger joints and more uniform material clinch, was developed by Mr. Powers with the cooperation of the Engineered Fasteners Division of the Townsend Co. Mr. Powers says: "Perhaps the greatest single saving has been in labor—and that's worker fatigue besides direct cost. Using Tow- send lockbolts and installation to minimizes worker fatigue and sa hazards. These lockbolts have h tensile strength and are driven ti every time. The tight, permane joints they produce won't loosen u der extreme vibration and shock. T use of lockbolts eliminated the working costs involved with impro erly driven rivets. Job inspections a also faster."

The shop is attaching wood flo ing with flathead ⅜-in. lockbolts, i ing a one-piece collar and clip asse bly. The one-piece collar and cl assemblies used at Clinton were d signed to C&NW specifications. I operation, the lockbolt pin tail inserted through the flooring an through the collar-clip assembly. pneumatic-hydraulic gun then en gages pull grooves on the pin an clinches the material together, simu taneously swaging the collar into lock ing grooves on the pin. After this per manent joint has been completed, th lockbolt tail is broken off at a "break neck" groove. "All the action take place in the time it takes to pull th trigger," Mr. Powers said.

He also pointed out that "applica tion of Townsend lockbolts eliminate the clip twisting that's encountered when using impact bolts. The clip always in line. No extra operation needed to realign it."

To reinforce the sides and sills o box cars at the door openings, gusse plates are applied with special ⅝-in lockbolts having special low-pro fi heads. The special head, designed spe cifically for this application, covers th enlarged holes produced when rivet are burned out. It also allows ca doors to slide without interference.

While the collar and clip assembl and the flat head lockbolt were specifically designed for the C&NW, Town- send produces stainless-steel, carbon- steel and aluminum lockbolts in sizes from 3/16 to ¾ in. with five standard head styles. The C&NW uses the pneumatic-hydraulic type lockbol gun at Clinton, but a heavy-duty elec- tric-hydraulic type is also available. The pneumatic-hydraulic gun weighs 10½ lb. and can be used in any posi tion with one hand. It operates on 85 to 100 psi compressed air, developing up to 14,000 lb. pulling power.



Armature is set up in stand; the epoxy bath is raised so as to coat the surfaces of coils and string bands as armature is rotated by small motor.

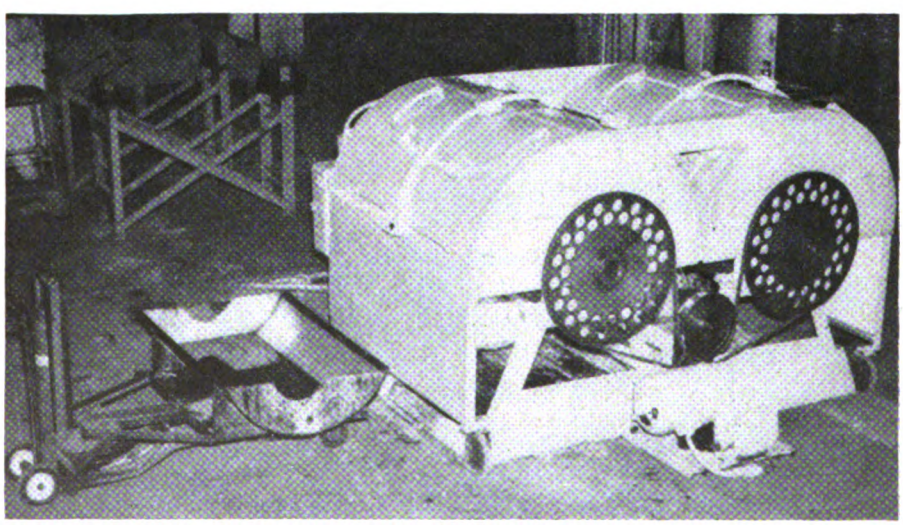
'Roll On' Epoxy Solves SAL Problems

The Seaboard has adopted a process for coating traction-motor armatures with epoxy. Rather than impregnating them completely, as is done by many railroads, the SAL's Jacksonville, Fla., shop applies the epoxy by what it calls the "roll-on" method. In this, the armature is dipped into a bath of liquid epoxy and rotated mechanically until the surfaces of coils and string bands are thoroughly covered. This surface treatment is then heat cured.

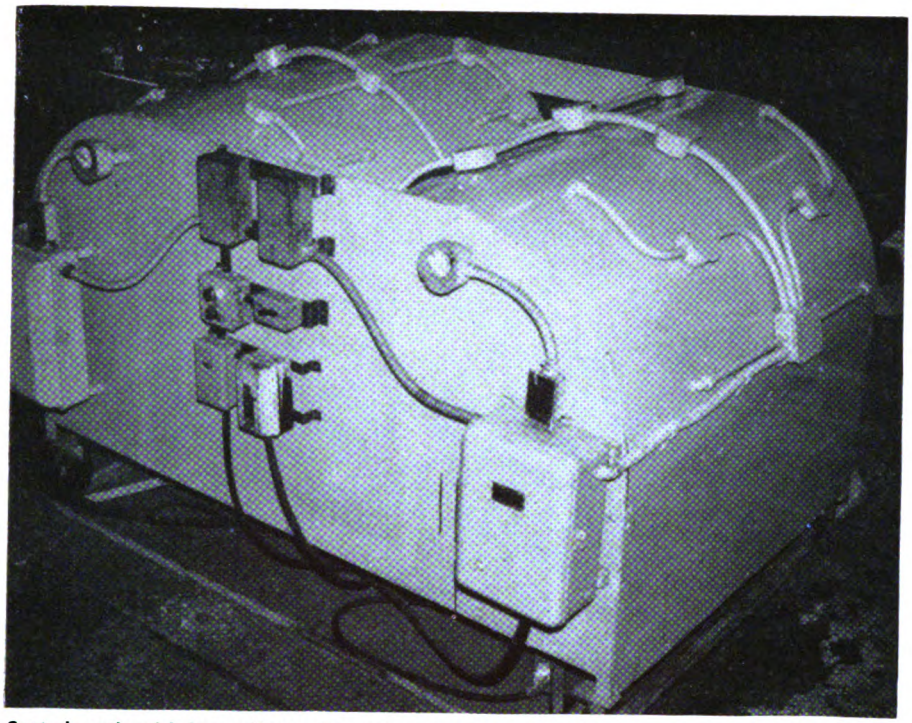
The epoxy coating has been found to have numerous advantages over the varnish finishes which were previously applied by painting or dipping. Organic varnishes tend to crack, allowing moisture to cause tracking to ground and producing areas in which carbon dust, dirt, cleaning agents, and oils would remain, adversely affecting surrounding insulation. Such varnishes do not have sufficient mechanical strength to prevent movement of coils and associated parts. For the Seaboard, this meant that wedges would loosen prior to the time when traction motors would otherwise require overhaul. This made it necessary to bring the armature to the electrical shop for an additional varnish impregnation or dip. When coils did loosen in the slots, there would be fretting of the insulation, which was evident from the mica dust which could be found on the armature. Such damage to insulation complicates armature overhaul.

The epoxy which is now used for armature coating does not crack from vibrations or from the expansion and contraction which occur during normal motor operation. The epoxy also gives sufficient mechanical stability to coils, wedges, and insulation so that they can operate between overhauls without attention. The epoxy coating also makes the entire armature surface impervious to all chemicals used in railroad cleaning compounds.

All of the phenolic varnishes were weakened diaelectrically by cleaning materials, particularly those containing trichlorethylene. The manufactur-



Hood with quartz lamps is rolled over the two armatures. One may be undergoing preheat while the other is curing following application of the low-viscosity epoxy compound.



Controls extinguish lamps if armature ceases to rotate, regulate temperature in proper range for curing, and can be set to give the proper timing cycle for the process.

er has told the SAL that the epoxy it is using is affected only by fluorides. No such compounds are used on the railroad. The smooth, impervious surface of the epoxy has proved to be extremely easy to clean, both in running repair shops and at basic overhaul periods. It can be done without mechanical or chemical disturbance of any of the armature components.

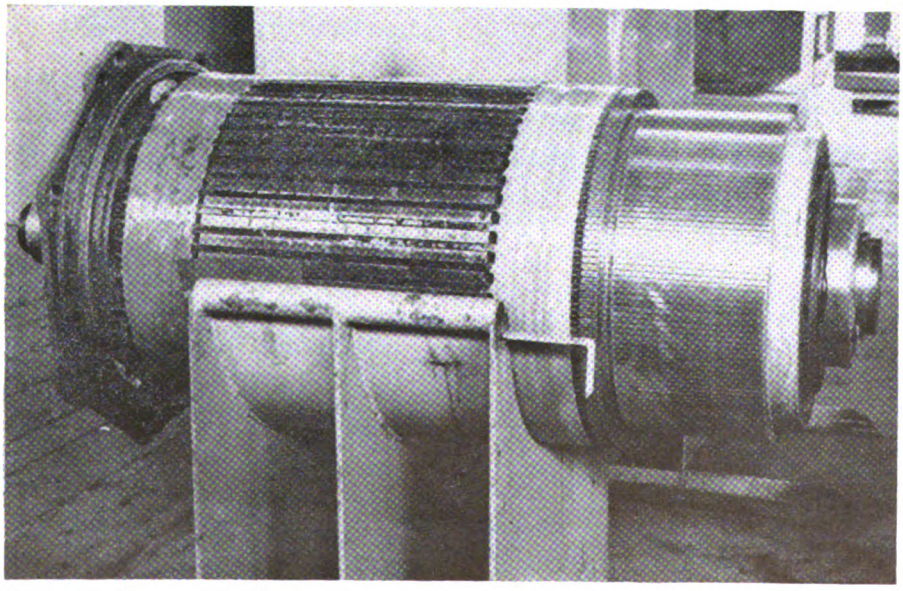
When this method of surface treatment was adopted, it had been anticipated that all these results would be achieved. However, after some service with motors having armatures which had been treated with the epoxy roll-on process, another advantage became evident. It was found that flashover problems were far less serious. Organic or semi-organic varnishes are badly affected by flashovers in the string-band area. Carbon deposits are formed which produce tracking to ground. Flashovers on epoxy-surfaced armatures did not leave any such conducting paths.

To apply the epoxy material, the SAL shop at Jacksonville, has built a device for preheating the armature, applying the epoxy, and curing it after application. The intense heat developed by the banks of quartz lamps that are in this unit could damage an armature if it remained stationary under them. The unit is designed to rotate the armature at low speed while it is being heated, during the epoxy application and during the curing cycle. Because of the low viscosity of the epoxy as applied, the rotation assures uniform coating during both application and curing. Actually, the machine is designed to process two armatures simultaneously. It consists of a pair of armature stands, a 1.5-hp motor which rotates both armatures through a speed reducer and pulley drive, and a track-mounted hood with the quartz lamps and lamp controls.

The liquid epoxy, which has a shelf life of about 30 days, is kept in a shallow pan mounted on a special hydraulic jack that can be moved into the roll-on position after the hood is moved back on its tracks. Each stand supports an armature on its bearings.

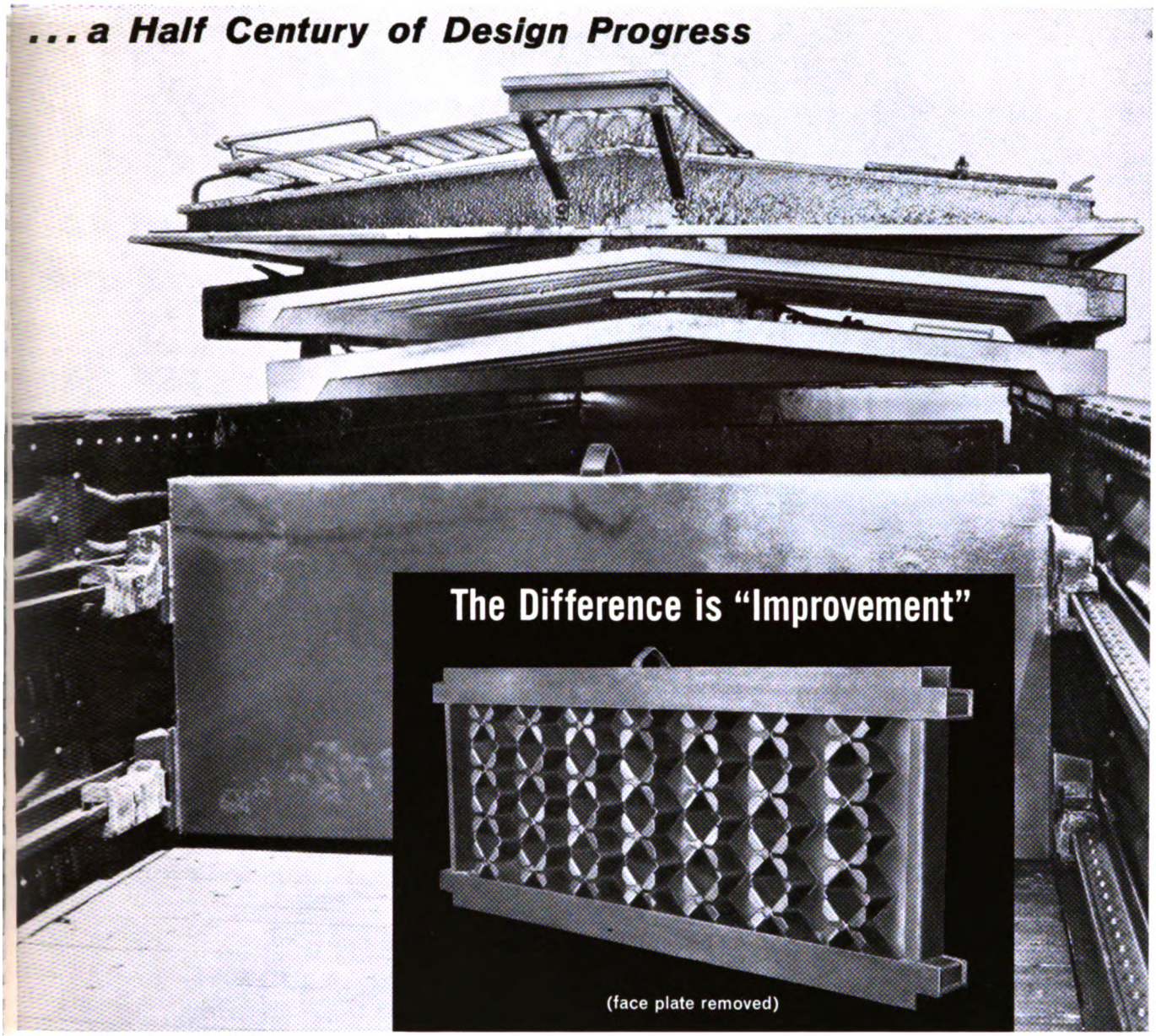
Prior to placing a rebuilt or overhauled armature in the roll-on device, the commutator is wrapped and taped so no epoxy will be deposited on it. A special speed reducing pulley is mounted on the shaft at the commutator end, and the V-belt from the small speed reducer unit is installed. After the armature has been set up in the stand and pulley applied, the motor starts turning it at 2 rpm. This is continued until the armature has been heated to 120 deg F. The hood is then rolled back and the hydraulic jack with the pan containing the liquid epoxy is rolled under the armature and raised so that the armature surface is immersed about 2 in. The armature is allowed to make four revolutions through the epoxy material before the pan is lowered and rolled out of position so that the hood containing the quartz lights can be rolled back into position to start the curing process.

Because of the intense heat developed by the quartz lights, the control system is wired so that the lights will be extinguished any time the armature stops rotating. This is done to prevent localized heat damage to the armature surface which would result if it were stopped under the lights. Each of the two hoods has ten translucent 1,000-watt quartz lamps. Thermostatic control maintains oven temperature at between 150 and 160 deg for curing. A timing switch on the oven allows the oven to be operated for its 3-hr baking cycle without attention.



Armature surfaces coated with epoxy have proved to be impervious to cracking caused by vibration and are not affected by the various cleaning materials put on them.

...a Half Century of Design Progress



Standard [impact-resistant] Bulkheads

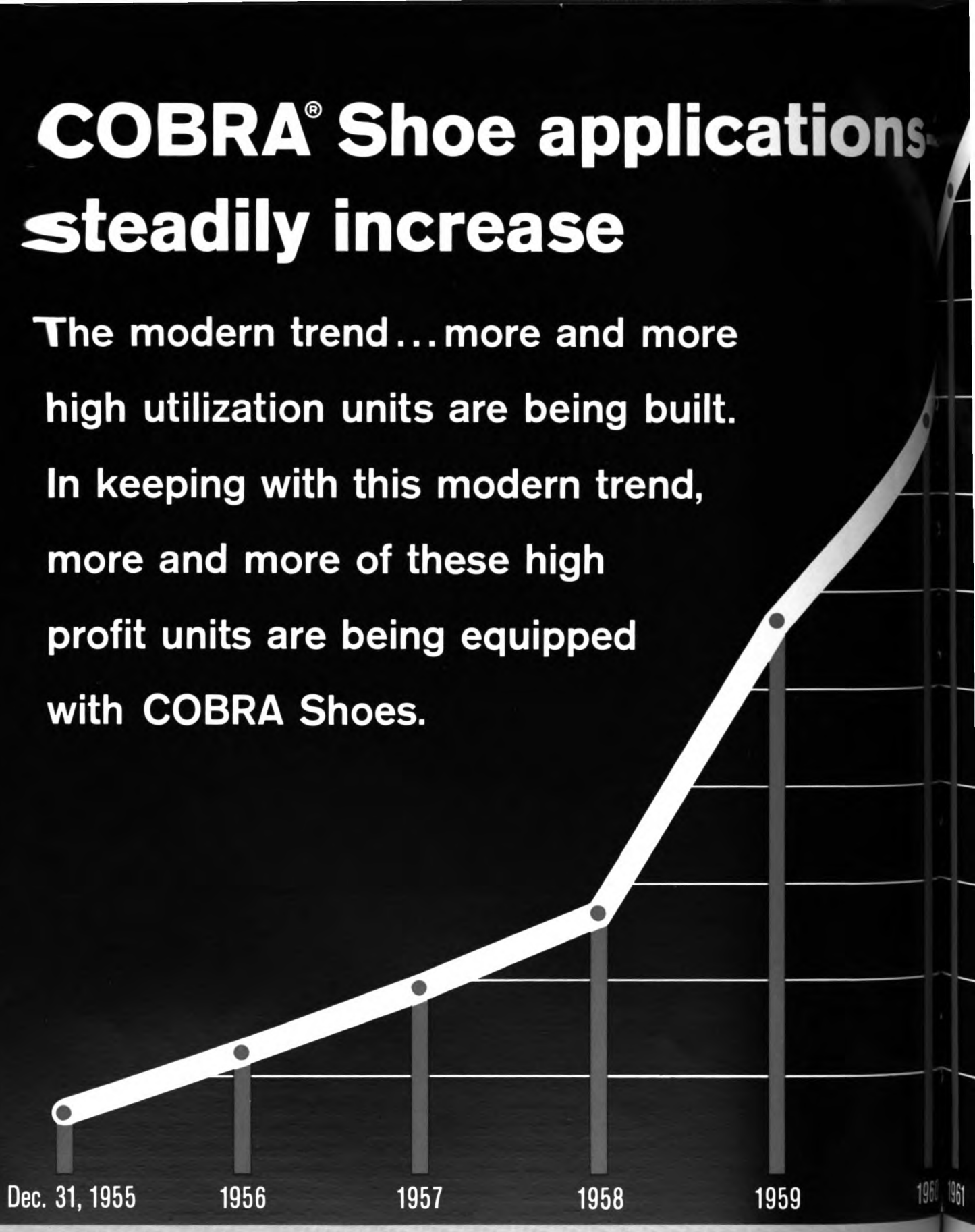
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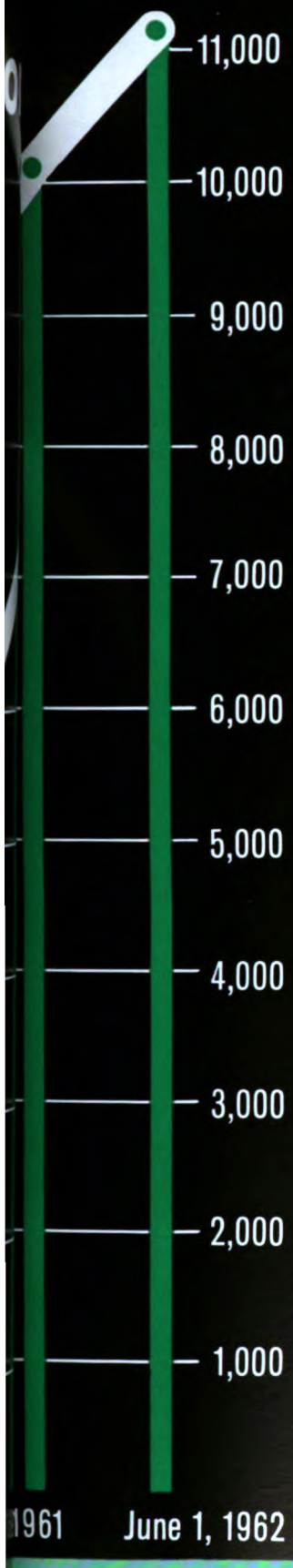
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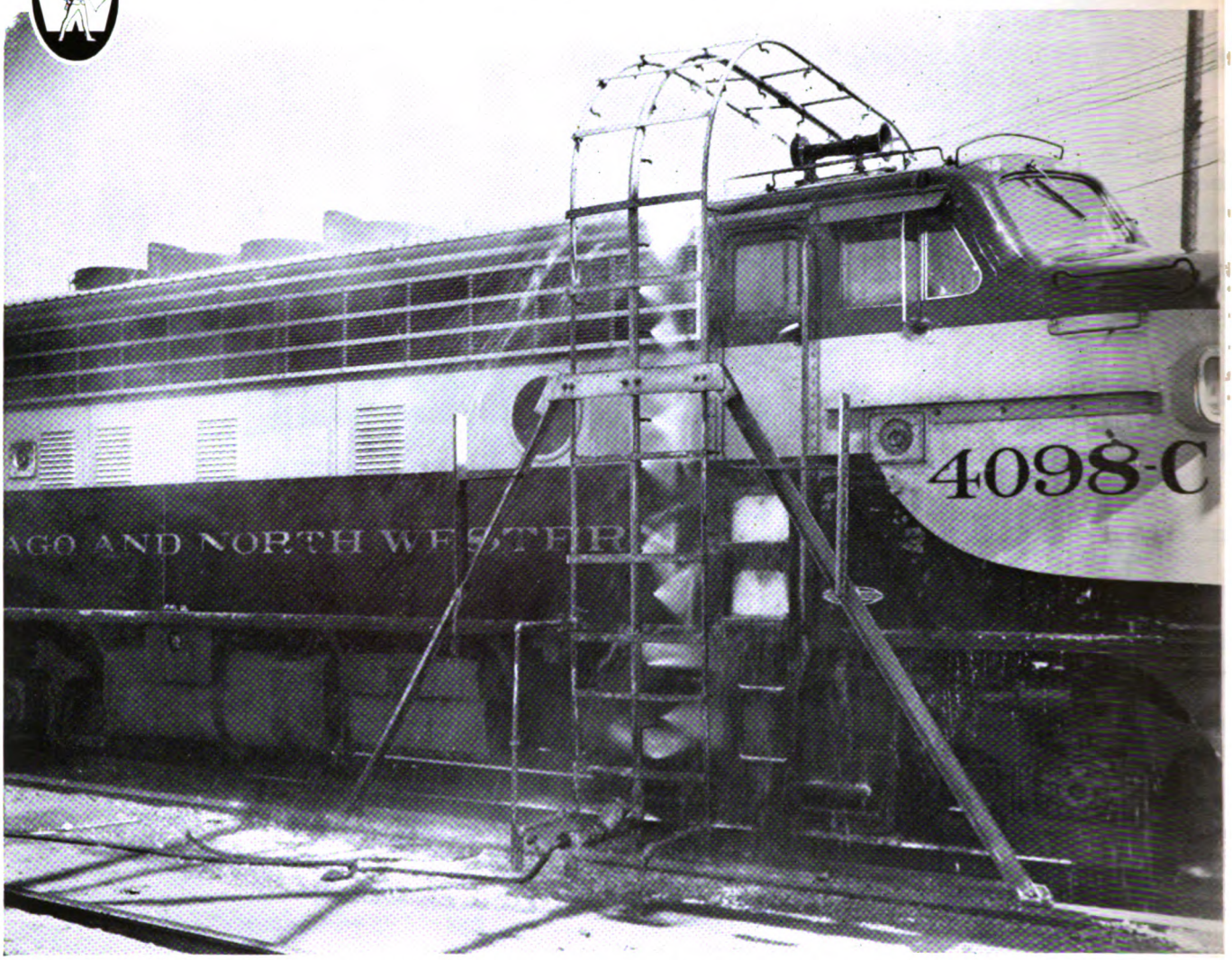
11,176 locomotives and cars for 179 properties



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mproving the Performance of Brushes

y M. S. May and J. C. Copella

Electrical equipment manufacturers ke many precautions to build equipent with the tolerances required for ɔtimum brush performance. This, ɔwever, has been found to be no ıarantee of long, trouble-free operaɔn. Brush performance can deteriote within a relatively short period of rvice. This is particularly true of ilway service due to its severity reılting from such things as:

- Overloads when starting heavy ıins;
- Operation at light loads;
- Exposure to dust, smoke and ıses of various types;
- Exposure to excessive oil and oil mes;
- Exposure to rain, snow, ice, and rty water splashed into the equipent;
- Variations in temperature from ountains' winter cold to deserts' sumer heat;
- Variations in humidity from that seashore in summer to that of high ountains or deserts in winter.

Frequently this poor brush service not the fault either of the machine the brush. Other factors contribute the deterioration of commutation, lversely affecting brush operation.

Manufacturers take many steps to assure good commutation. Consideration must be given to machine vibration, geometry of commutator surfaces, design and maintenance of brush holders, choice of brushes, and design of magnetic circuits. Factors affecting machine vibration include bearings, armature bands, commutator surfaces, and method of driving the load.

In assuring proper geometry of commutator surfaces, bars must be maintained at a uniform height and should not be skewed. Slots should be free of mica fins and high mica. The commutator surface must be concentric with bearings, and there should be no distortion resulting from either centrifugal forces or heat. The commutator surface must have proper finish.

Brush holder design and maintenance are important. The brush must have a proper fit in the brush holder, and the holder must be properly aligned with the commutator. Spacing between brush holders and the spacing between each holder and the commutator must be properly established. Brush design must be proper, and testing can assure that the proper grade is being used. Commutation also depends on proper design of magnetic circuits. Factors involved are equal spacing of field poles, uniform air gaps, and absence of saturation at rated load.

As a rule, all these factors are studied and applied in accordance with the intended usage of the machine and its operating requirements. Commutation is usually adequate when the machine leaves the factory.

Lack of maintenance while machines are in service can be serious. This stresses the need for sufficient preventive maintenance. Machine deterioration and its effect on brush operation can be measured. It can be observed in a laboratory or in actual locomotive operation.

In a laboratory, a 15-kw generator was tested by the black-band method under a variety of loads. At the start of this test, the total runout of the commutator was about 0.00047 in. TIR (bar to bar, plus eccentricity). There was black commutation up to double the rating of this generator.

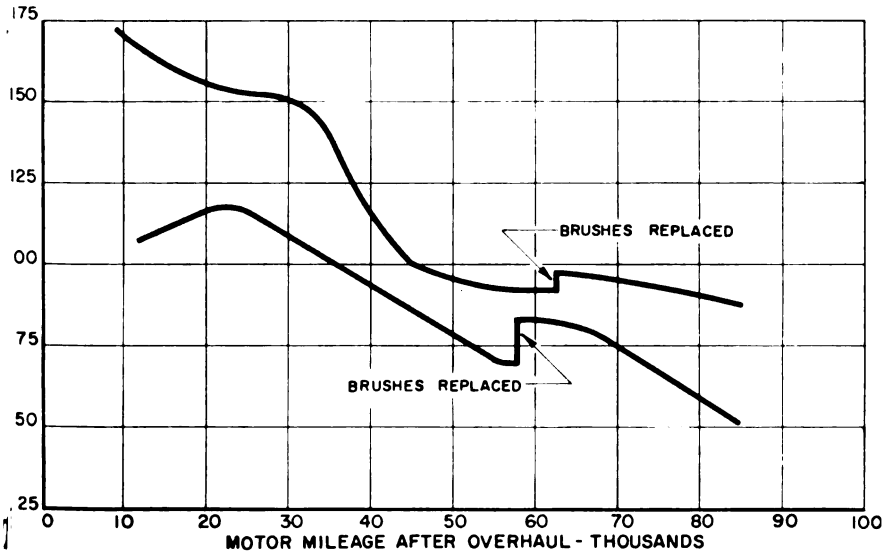
The machine was again checked after a continuous run of 170 hr on a cycle consisting of 50% of rated load, rated load, and then 50% overload. The runout of the commutator had increased to 0.0005 in. TIR. At rated load and overload, light sparking was observed at the brushes. A black-band test revealed that black commutation could still be achieved at rated load but not at overload. Average wear of all four brushes was 0.00014 in./hr. The condition of the commutator was fair, with slight edge burning on 8 or 10 bars.

The test was then continued for another 170 hr. It was soon apparent that deterioration was not only progressing, but was accelerating. Sparking now occurred at all loads. There was edge burning on several bars and on the trailing edges of the brush faces. Average brush wear had increased to 0.00030 in./hr and the TIR reading had gone up to approximately 0.0007 in. A black-band test revealed that there was no black commutation except at no load.

Another example of the decrease of brush life with service involves traction motors of diesel-electric locomotives. Commutation can deteriorate rapidly because of the extremely difficult conditions under which traction motors operate. Traction-motor commutators must frequently be reconditioned at 350,000-mile intervals.

Brush wear was carefully measured during 85,000 miles of service, using two different brush grades on reconditioned motors. This was on locomo-

. May and Mr. Copella are with Speer Carbon



o different brush grades were used on reconditioned traction motors in one test. Over a 14-nth period these motors were operated for 100,000 miles. Steady decrease in brush life was corded during the test.

tives in heavy freight service and extended over 14 months. Brush life does diminish as the mileage after overhaul increases. Expressed differently, the wear rate increases with motor service. The only significant rate change—the hump in each curve—occurred when new brushes were installed. Increased spring pressure and improved stability resulting from greater brush length produced this temporary improvement in performance. While the testing was discontinued after 85,000 miles, it is known that reconditioning the commutators could change the rate of brush wear so that original performance could again be approached. Stoning commutators periodically can definitely pay for itself in increased brush life. Several other tests produced similar results.

Even though the machine is properly designed and the proper brush is used, brush performance can still deteriorate. Vibration may result from worn bearings or inadequate mounting supports. Bearings must be properly lubricated and worn bearings must be replaced. Mounting supports should adequately support the machine in service. A worn coupling or gear, or a loose belt or pulley can also cause vibration. Geometry of the commutator surface greatly affects brush performance and should be given special attention. The commutator requires periodic stoning in its bearings, lathe turning, and, possibly, tightening. As the commutator is worn in service, care must be taken to keep the mica insulation between bars properly undercut.

The brush-pressure arms should be checked periodically to assure that they exert the force recommended by the builder. Maintenance must not, however, affect the position or alignment of the brush holders. Any deviation from the neutral position can cause sparking and burning.

Even though the design and grade of brush are carefully selected, certain machines may not perform satisfactorily because of local conditions such as chemically contaminated atmospheres. Machine and brush manufacturers can suggest solutions.

Magnetic circuits of rotating electrical equipment have been carefully designed and should not be disturbed during maintenance. Connecting an interpole in reverse, or leaving out some of the shims between the pole piece and frame of the machine can upset the machine's magnetic circuits.

Another cause of unsatisfactory commutation is running the machine on loads for which it was not designed. No load, or extremely light loads can result in high brush friction and are often as detrimental as overloads.

While commutation is usually satisfactory on new motors and generators, it can deteriorate. Preventive maintenance can pay for itself with improved brush life, reduced commutator replacement, and increased locomotive availability.

Million-Mile Month

First million-miles-per-hotbox-setoff month in AAR records was April 1962. Confirming preliminary figures reported by Railway Locomotives and Cars last month, W. M. Keller, AAR vice President—research, announced on July 25 that the average hotbox performance record for all railroads in April was 1,028,090 miles per setoff. This was up from 448,133 miles per setoff in April 1961. "This spectacular record is the result of combined research efforts of the railroad industry," Mr. Keller commented in reporting the figures. "The advances involved in this rapid progress include changes in bearing design and lubrication methods, modifications to the journal box and other new ideas developed in the laboratories of the AAR." Mr. Keller pointed out that the mileage record was accompanied by a reduction in servicing required, thus expediting train movements while reducing hotboxes. April 1962 should have marked the last month when there were waste-packed cars in interchange service. The mandatory date for installation of lubricating devices was May 1, 1962. In April, when 2,569,389,228 car miles were operated, there were hotboxes involving 1,872 pad-equipped journals, and 625 hotboxes in the "waste and others" classification. The total of 2,497 compares with 5,800 for April 1961. The past decade has shown these April national average figures:

April Comparative Performance

Year	Set-Offs	Average Mileage	Year	Set-Offs	Average Mileage
1962	2,497	1,028,990	1957	12,396	228,493
1961	5,800	448,133	1956	10,083	290,626
1960	12,196	223,494	1955	9,956	280,002
1959	11,216	243,032	1954	8,228	312,411
1958	9,295	264,093	1953	9,818	290,359

MP Nose Supports

(Continued from page 23)

other types of mountings were also evaluated and tested. Pieces were even cut from dock rubber and fitted between the spring holders. It was found that there was no way to hold such a flexible unit in the mount. The rubber tended to squash out so that unwanted clearance would develop. The motor would then bounce excessively in service.

The one-piece design produced by Lord has overcome this drawback. Bonded construction, using multiple steel shims, proves the stability and high load-carrying capacity while being easy to install. The elastomer is specially compounded to assure long service life in the railroad environment without degradation of its performance.

The MP has not encountered any problems of interchangeability. The one design of elastomeric mounting fits all leading makes and types of traction motors. The MP has them in service on the following types of locomotives: EMD E-7 2,000-hp passenger, EMD GP-18 1,800-hp road switcher, EMD F-7 1,500-hp road freight, and Baldwin 1,200-hp switcher. It is reported that several other roads are now using these units in substantial numbers.



CLEVITE: New source for EMD bearing replacements

Old but new. Cleveland Graphite Bronze, world's largest maker of large engine bearings, now offers its patented heavy-duty bearing for replacements of EMD main and rod bearings.

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The nickel barrier stops tin migration from the overlay. It increases bearing life by enabling overlay to withstand corrosion at all times. The abrasion resistance and surface action of the overlay maintain new bearing quality at all times.

Copper-Lead-Tin overlay: Fatigue life of the overlay is increased substantially by the addition of 3% copper in the precision electroplated overlay.

CLEVITE

Improved – yet the cost is less! Only Cleveland Graphite Bronze can offer this improved four layer bearing. Take full advantage of this product that combines product improvement with cost reduction. For complete information, contact *Cleveland Graphite Bronze, division of Clevite Corporation, 17000 St. Clair Avenue, Cleveland 10, Ohio. In Canada: Clevite Ltd., 1177 Talbot, St. Thomas, Ontario.* Also manufacturers and distributors of the Clevite Journal Bearing Cartridge.

Reefer Units Need Precise Controls

By F. Abbott Chapman

Temperatures in mechanical refrigerator cars, piggyback trailers and containers must be closely controlled. The key to successful transport of frozen and perishable commodities is automatic temperature control capable of meeting the severe requirements of railroad refrigeration service.

There are a number of different types of temperature control for in-transit use and a variety of ways to apply them. Practically all controls utilize liquid-filled thermal systems. Mercury, which is virtually incompressible, is used to produce the expansion or contraction effect because it can exert great force when harnessed in control systems. Mercury-filled system controls are well suited for rail applications, making possible instruments which are rugged and able to withstand vibration and shock. Mechanisms of Partlow instruments are basically mechanical, without electronic circuitry. Common to all of these controls is the thermal element consisting of a temperature-sensing bulb, a capillary tube, and a plunger assembly.

The hermetically sealed sensing bulb is located within the lading space. It is positioned to sense the true temperature—usually in the return air stream. As lading-space temperature changes, the mercury in the bulb and capillary which connects it to the plunger assembly expands or contracts. When the mercury expands against the plunger in response to a higher temperature, it moves against the control mechanism, actuating the appropriate control function. As the mercury contracts when temperature drops, the spring-loaded plunger also retracts, actuating the reverse control function.

Such control has a normal accuracy of 1% of scale range. For example, if a refrigeration control has an overall range of 150 deg—minus 30 deg F to 120 deg F, it will be capable of sensing and reacting to variations of lading space temperature within 1.5 deg F when the system is properly engineered and installed.

Controls for railroad applications normally are electrically operated. The body of each control has the mechanical linkage, up to five switches, and the temperature setting dial and mechanism. It can also include accessories such as relays, indicating lights and chart drives. Most controls have at least two switches—one to control the refrigerating process, the other for heating. Four and even five switches may be used if multi-stage cooling and heating are required.

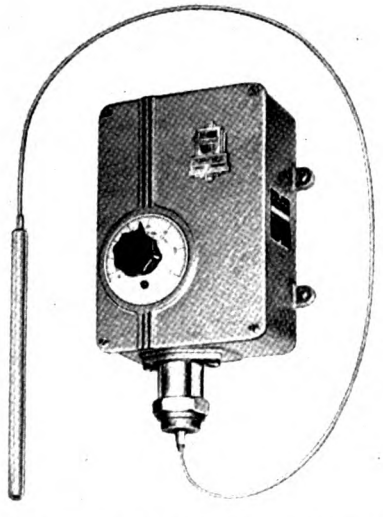
The control itself can be one of several general types, depending on the required functions:

- Non-indicating control, which is widely used in rail applications, has a calibrated scale on which the desired control temperature is set. A separate indicating or recording thermometer is frequently used with this system.
- Indicating control, which both regulates and indicates the temperature simultaneously, has one pointer on a calibrated dial that indicates the lading space temperature and another pointer indicating the set-point temperature.
- Recorder-controller regulates the temperature and makes a continuous record of it on a circular chart which is either spring- or electrically driven.
- Recording thermometer operates independently of the control unit, doing only the temperature recording job and involving a separate control unit.

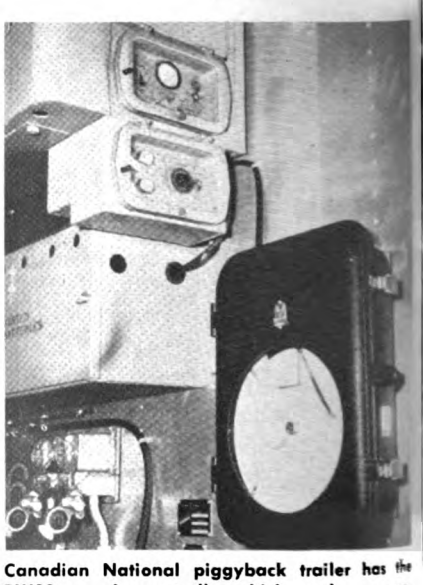
A multi-stage non-indicating Partlow Model ZCC with four switches is used on Pacific Fruit Express cars with Trane refrigeration. These cars, produced in the 1,000-car construction program completed last year by PFE (RL&C, Aug. 1960, p 29), are designed to maintain any temperature from minus 10 deg F to 70 deg F, making them capable of carrying either perishable or frozen cargo. When refrigerating fresh produce, the refrigeration system operates at capacity, with all compressor cylinders fully loaded during initial pulldown. When the temperature sensed by the Partlow bulb is 2 deg above the set point, a switch in the control is actuated to slow the engine's speed, reducing the cooling rate and conserving fuel.

System Operation

As temperature continues to fall the remaining 2 deg to the set point, a third cycle is actuated to reduce the cooling rate still further by unloading several of the compressor cylinders. If ambient or cargo conditions permit lading space temperature to fall 1 deg below the set point, another switch deactivates the cooling unit completely and puts the system into a "null" cycle. Under certain climatic conditions and at certain temperature settings, it is possible that heating will be required. If the control senses that lading-space temperature has fallen 2 deg below the set point, a switch actuates the heating



Multi-stage control of refrigerator car mechanical equipment can be provided by this non-indicating Partlow ZCC control device.



Canadian National piggyback trailer has the RWSS recorder-controller which produces a permanent record of equipment operation.

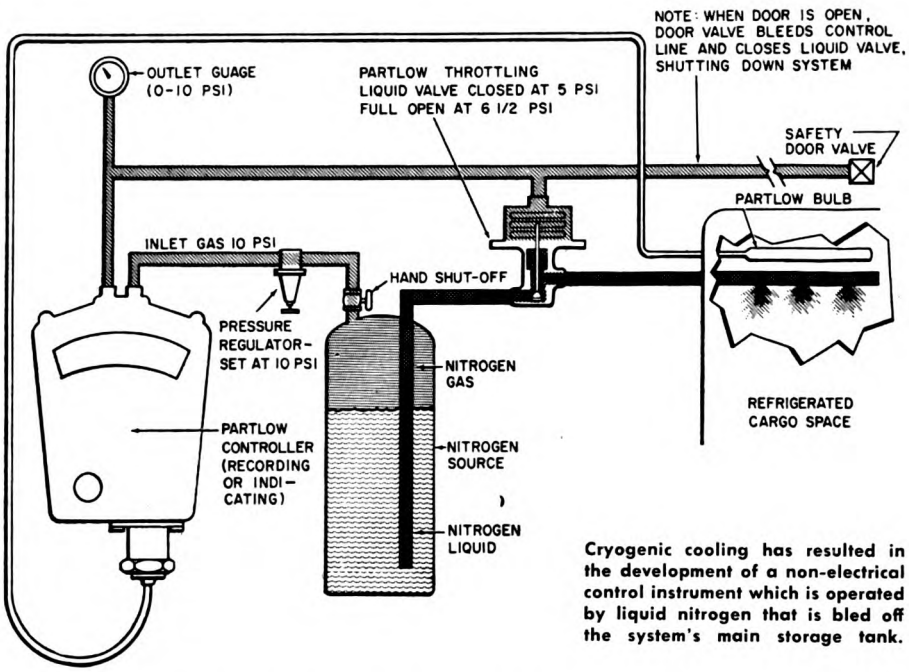
Mr. Chapman is assistant chief engineer, The Partlow Corp., New Hartford, N. Y.

cycle. In the case of the PFE cars, this is accomplished by energizing the electric resistance heater units in the unit's evaporator coil. In normal day-to-day operations, conditions are usually stabilized so that the control cycles the equipment between heating and the null zone, or between the null zone and the partially unloaded, low-speed cooling cycle.

In carrying frozen foods, the thermostat is usually set at minus 5 deg. The heating cycle is automatically locked out when the dial setting is turned down into the frozen commodity range. Heat lockout is accomplished by one switch which is actuated by the setting of the temperature selection knob.

Another version of this control was specified to regulate the Carrier equipment used on 200 mechanical refrigerator cars built by Fruit Growers Express and Western Fruit Express. These cars, built to operate between minus 10 deg and 70 deg F, have multi-stage cooling and heating similar to that used by PFE.

A simpler single-switch on-off control, Partlow Model ZS, is used by PFE in 500 cars with the Ice-Tempco cooling system designed for handling perishable traffic exclusively. Fans, powered by a diesel-driven generator, circulate air through conventional ice bunkers (RL&C, Feb. 1961, p 5). Two different arrangements are used by PFE, with the same instrument doing the controlling for each. One Ice-Tempco system has one fan which runs continuously to maintain air flow over the lading and thermostat bulb. When cooling is required, the thermostat turns on additional fans which then circulate air through the ice bunker and over the lading. When the system is not calling for cooling, the control turns these fans off and closes dampers to prevent circulation of air through the single ice bunker used in this type of car.



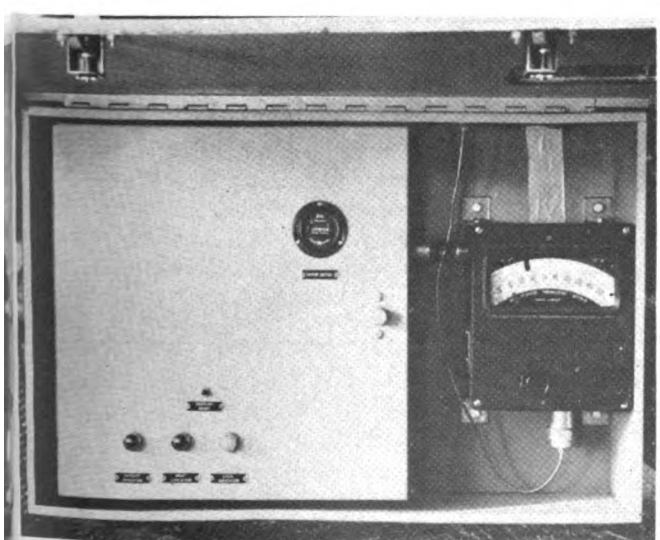
Cryogenic cooling has resulted in the development of a non-electrical control instrument which is operated by liquid nitrogen that is bled off the system's main storage tank.

The second Ice-Tempco system does not have dampers, but simply turns off the bunker fans. Either of these two arrangements can also be used for heating. When the car is in heater service, a heater is placed in the ice bunker. A switch in the control is placed in the Heater Service position, reversing thermostat action so that it stops the circulating fans with a rise in temperature.

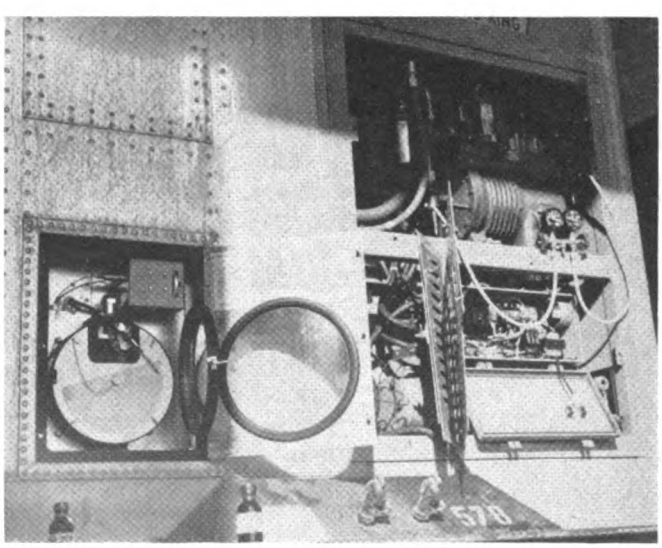
Another Partlow control—Model —DW a three switch indicating instrument, has been designed specifically for piggyback refrigeration. It is used on PFE trailers, and a slightly different version is used by Fruit Growers Express. The control's three switches make it capable of four-stage modulation. Servicing personnel or tractor drivers can check trailer temperatures on the indicating dial at any time. The control has two dial-operated heat lockout switches.

Another indicating control, Model LSS, is a two-switch instrument with an auxiliary lockout feature, used by Worthington for its refrigeration systems for piggyback trailers and cargo

(Continued on page 38)



Open control compartment on this Pacific Fruit Express piggyback trailer refrigeration unit shows Model DW three-switch indicating control unit which makes possible quick checking of temperatures.



Cargo container used in export service has RSS recorder-controller on which portion of chart has been cut away to show portion of the control mechanism which is in the instrument.

Diesel Problems Are LMOA Targets

Solving of problems associated with motive power maintenance has always been the primary function of the Locomotive Maintenance Officers Association. In addition to topics assigned for the year-long consideration of the seven LMOA technical committees, the organization will this year handle additional problems which have been posed by those interested in increasing the efficiency and economy of motive power maintenance. A "What Is Your Problem?" session has been scheduled for the morning of Sept. 19, last day of the three-day annual meeting of the LMOA at the Sherman House in Chicago. A panel composed of the seven technical committee chairmen and headed by J. J. Dwyer, chief chemist, Chesapeake & Ohio, will give the solutions to problems which have been submitted through this magazine or directly to LMOA officers.

From those submitted, the panel has already chosen 14 of the more important which are scheduled for discussion *(see box)*. Solutions will be offered for all these at the LMOA Meeting. Panelists are aware, however, that there may be various solutions and are urging that anyone with opinions on these problems submit his ideas. The group is also interested in receiving additional problems for discussion. The coupon below may be used for submitting either solutions or problems to this magazine.

In addition to Mr. Dwyer, other members of the "What Is Your Problem?" panel include S. C. Snow, superintendent motive power, Louisville & Nashville (Shop Equipment); K. L. Pollitt, manager system assembly shops, Southern (Diesel Material Inventory and Control); C. A. Wilson, general supervisor diesel engines, Santa Fe (Fuel and Lube Oil); C. J. Frey, electrical department foreman, Rock Island (Diesel Electrical Maintenance); G. W. Niemeyer, mechanical superintendent, Missouri Pacific (Diesel Engine Maintenance); T. W. Bellhouse, superintendent mechanical department, Cotton Belt (Diesel Mechanical Maintenance); W. F. Dadd, general superintendent motive power, Baltimore & Ohio (New Developments in Motive Power Maintenance).

Among Today's Problems

- Which is the preferable method of honing cylinder liners—by hand or by machine? *(Shop Equipment)*
- How should rebuilding of traction motors be handled—by the railroad shop or by an outside organization? *(Shop Equipment)*
- What diesel reclamation is practical and economical with today's reduced maintenance forces? *(Material Inventory and Control)*
- Which is preferable—to reclaim cylinder liners by chrome plating or by boring to oversize? *(Material Inventory and Control)*
- Is it practical to mix several brands of lube oil, or should only one brand be used, especially in higher horsepower diesel engines? *(Fuel and Lube Oil)*
- Are present automatic refueling systems practical? *(Fuel and Lube Oil)*
- What can be done about eddy current losses in high-mileage armatures? *(Diesel Electrical Maintenance)*
- How can excessive vibration of traction motors be controlled? *(Diesel Electrical Maintenance)*
- When valves break, is there an effective method for preventing broken metal pieces from entering and damaging turbochargers? *(Diesel Engine Maintenance)*
- What is the most practical way to overcome excessive leakage of engine cooling water from radiators? *(Diesel Engine Maintenance)*
- What can be done to eliminate thermal cracking of diesel wheels? *(Diesel Mechanical Maintenance)*
- How can fouling of air brake equipment, resulting from oil and tar carrying over from locomotive air compressors, be avoided? *(Diesel Mechanical Maintenance)*
- Is it practical to winterize diesel units by pressurizing the engine rooms by diverting air discharged from cooling fans? *(New Developments in Motive Power Maintenance)*
- How can present diesel unit sanding systems be improved? *(New Developments in Motive Power Maintenance)*

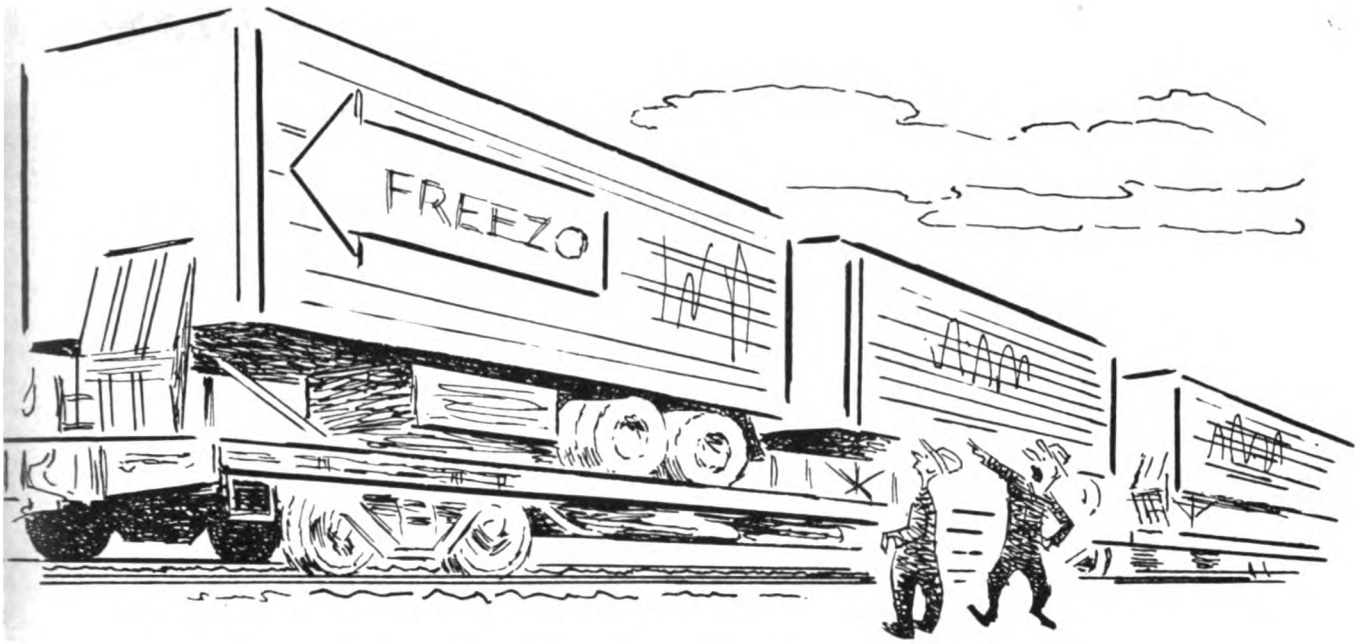
Problem and Solution Coupon

Name .....

Title .....

Railroad .....

Address .....



Talking Turkey To Pete

By Ken Wright

Pete had been remarkably quiet; at was because he had the fewest ›mplaints and was happiest when he as trouble-shooting. Now, in addi-›n to its large fleet of mechanical frigerator cars, his railroad was ındling more and more refrigerated ggyback trailers. These trailers were so the responsibility of the main-nance gang with which Pete worked. elving into all the new equipment ·oved to be a "heyday" for Pete. ctually, the refrigeration equipment as not too much different from that ı the mechanical refrigerator cars. ariations in design and arrangement d present Pete with challenges. Some the refrigeration units were powered small diesel engines, while others ıd liquified petroleum gas (LPG) or ısoline engines.

One Tuesday found Pete his usual umpy self. He had just been called ›wn for having given the pre-trip spection to a piggyback which had en failed to cool a load of frozen rkeys properly while en route. The ailer had just that morning arrived ıck at the shop for another pre-trip spection. Pete went over it thor-ıghly, finding nothing wrong. It was sheartening not to find anything after e reprimand he had received. After explaining all this to his boss, "Big Jim," it was agreed that there must have been some other reasons for the failure.

Big Jim contacted an acquaintance at the frozen food plant where the turkeys had been loaded. After some questioning, it developed that, to get more in the trailer, the cartons of turkeys had been loaded without floor racks directly on the trailer floor. Cartons had also been packed in under the evaporating section. All this meant that the only air circulation space in the trailer was around the evaporator and along the top of the load. With such incomplete circulation, the heat could not be removed so the load would be cooled properly.

"I knew it," said Pete; "I knew there was nothing wrong with that trailer when it left here. And there's certainly nothing I can do about the way they load it when it gets to the shipper's plant."

Big Jim conceded this, saying he would contact the traffic people so they could tell the customer how to place similar loads in the future to assure proper cooling. "They really need to talk turkey to that packing plant," was Pete's final comment as he started back to work.

Later he was approached by one of the men of his gang. "Pete, I've got a problem that has me stumped. Could you give me any clues?"

"You've got a problem?" asked Pete. "Who hasn't? I get problems that I can't possibly fix or even do anything about."

Pete was still upset about that trailer of turkeys. "You've got a problem? What is it?"

"The trailer I'm working on won't show charge on the battery charging ammeter. I've checked everything. I've looked at the belt to the generator; it's OK and the generator is turning. All of the wiring seems to be all right. The trouble must be something deeper than that."

The two had arrived at the trailer. Pete glanced at the ammeter which was showing discharge. He noticed that the control panel door was open. When he saw the voltage regulator, he groaned. "Oh, no! Have you been beating on this regulator?"

"Not exactly. I wouldn't call it 'beating on it.' When I saw the battery wasn't charging, I figured the contacts in the regulator were not making contact, so I tapped the regulator a bit. I've done it many times before and always the regulator goes to work. What's wrong with that?"

"Well," said Pete, "tapping is one thing and hammering is another. From the looks of that cover, I wouldn't call it 'tapping.' Besides, there aren't any contacts in that regulator to close; it's a transistorized regulator. Even with the older types of regulators, tapping

is is the nineteenth article in this series scussing the operation, maintenance and ›uble shooting of mechanical refrigerator rs and piggyback trailers.

on them doesn't correct a thing. It may cause them to operate temporarily, but they will fail again. If something is causing a regulator to fail, tapping won't remove the trouble permanently. I'll skip the long tirade. What else did you do?"

"Let's see. I figured that maybe the generator needed polarizing. I shorted between the regulator terminals and ground. That is a standard procedure, so it can't be wrong."

"It's just as wrong as can be," replied Pete. "Do you still have a crystal radio at home, or have you advanced to TV? Don't you realize that a new type of battery charging system might just require new procedures. The generator is a self-rectifying a-c type, utilizing this transistorized voltage regulator. The generator doesn't require polarizing, and to do so will destroy the regulator.

"Now we won't be able to determine what caused the failure in the first place. By hammering on the cover of the regulator you've eliminated any chance of a warranty claim if this equipment is still under warranty. We will probably be buying a new regulator."

"OK, Pete, I goofed. But still I want to know how can you be sure that it's the regulator that is defective. Couldn't it be the generator instead?"

"Sure it can be a defective generator," said Pete. "I didn't mean that the trouble was definitely in the regulator; I'm just guessing. Since you polarized the generator, both could be defective now. If the original failure was in the generator, you may have destroyed the regulator too. We'll make some checks to find out."

While the two men were picking up their tools, Pete explained some more about the two pieces of equipment. "This self-rectifying alternator is a simpler machine than the conventional d-c generator. Instead of a commutator, it has two slip rings. Slip rings are less troublesome than commutators, especially if lower voltages and currents are involved. Because a-c can't be used to charge a battery, there are some rectifiers mounted within the generator to produce a d-c output.

"The regulator contains two transistors, three diodes, two condensers, and some resistors. There are no moving parts or contacts. You've probably heard of 'solid-state electronic devices' and this is one of them. Its transistors and diodes are fairly rugged, but under some conditions can prove to be very delicate. While they are not generally affected by vibration or shock, they cannot tolerate excessive voltages. When a system using these transistors or diodes is designed, the normal and transient voltages are determined. The diodes and transistors are then selected to withstand the transient conditions.

"However, if some character like you comes along to polarize the generator, voltages may be applied to transistors and diodes higher than those for which they are designed. They can then be destroyed. Such solid-state devices also generate heat when functioning, making it necessary to have some method for dissipating this heat. They are generally mounted on radiating plates, commonly called 'heat sinks.' If the solid-state device is placed in an area where there are excessive temperatures, the devices can fail. Whatever you do," cautioned Pete, "don't use a bellringer test set on any circuit containing a solid-state device. The voltages generated by such a buzzer will greatly exceed the ratings of transistors and diodes. If you were to pick up a transistor and accidently ground it while it was in your hand, the static charge of your body would destroy it."

"My gosh, Pete; if they're so delicate, what are we doing with them?"

"You didn't get my point. They're not delicate unless they are abused. It's like a half-ton pick-up truck; it will do a fine job and give you long service if you don't put more than 1,000 lb in it. Put 5,000 lb in it and how long will it last?"

By this time the men had collected their tools and Pete had picked up the service bulletins on the generator and transistorized regulator. Pete always emphasized the importance of knowing where the information on each piece of equipment was available. It is important not to try to memorize all information and test procedures, but know where to find them quickly. This is particularly important when test procedures change with new models. Shutting the engine down, they followed the test procedure outlined in the Service Bulletin. It proved that the generator was all right, but that the regulator had been ruined. Turning the regulator replacement job back to his co-worker, Pete walked off mumbling "Why is it some people will take short-cuts when they don't even know the direct route?"

Reefer Controls

(Continued from page 35)

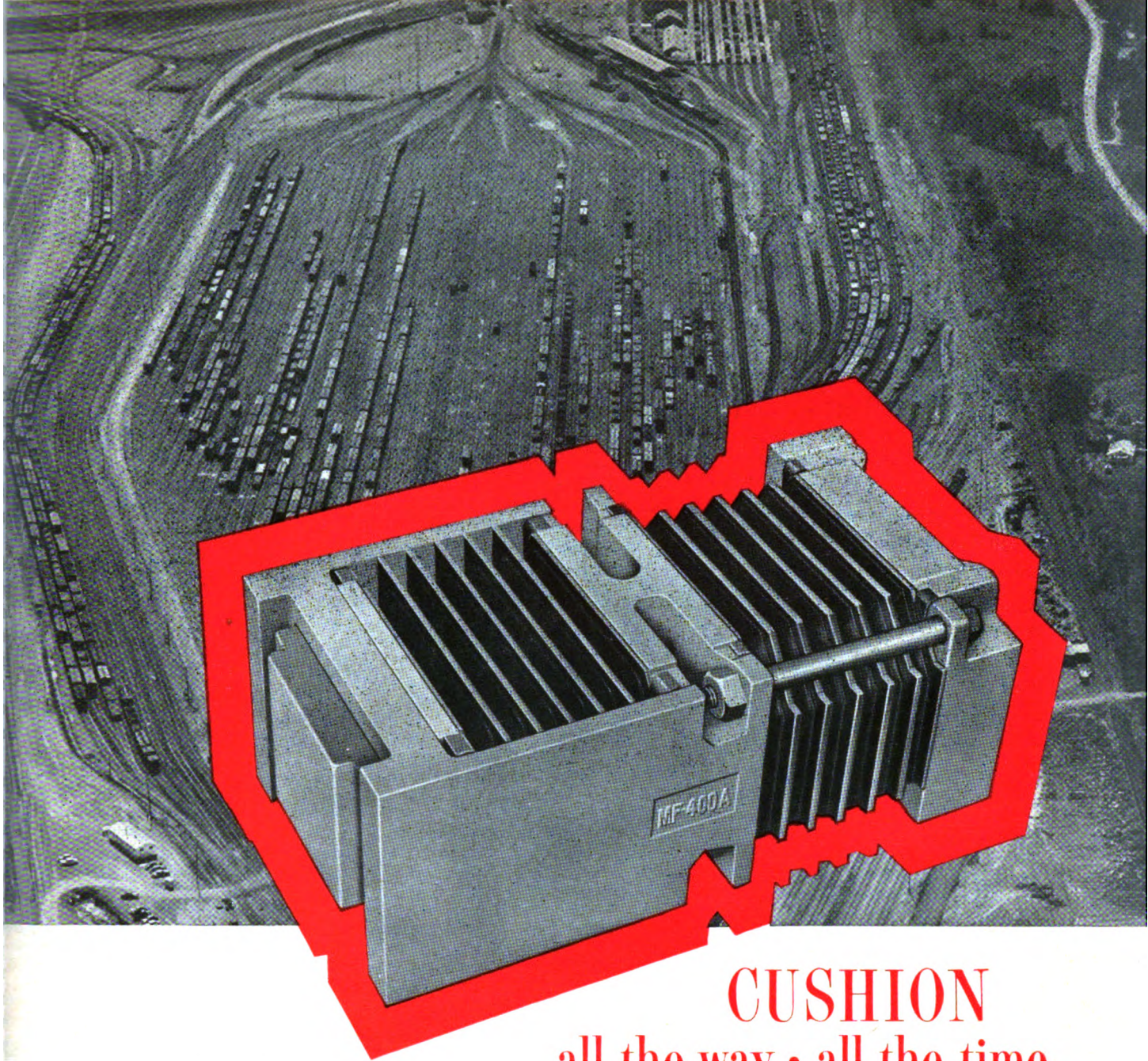
containers. This control is also equipped with an external switch for manual defrosting and with indicator lights showing in which cycle the equipment is operating. Worthington units may also be equipped with Model TRW recording thermometers as optional equipment.

Such recorders make a continuous record of the temperatures of the loading space, giving the carrier proof of the capacity of the equipment, serving to monitor the equipment continuously against mechanical defects which might develop gradually, and producing protection against unjustified claims.

The recorder-controller is of growing popularity, especially in piggyback and container operations. Typical Partlow recorder-controllers are used on Canadian National piggyback trailers. CN trailers, equipped with Model RWSS weatherproof recorder-controllers, have Canadian Thermo Control refrigeration systems.

The introduction of liquid nitrogen or cryogenic, cooling for piggyback trailers and refrigerator cars (RL&C June 1962, p 47) has created a demand for a control system which meters the flow of the refrigerant. This demand has been met by developing a self-powered throttling control for liquid nitrogen which requires no outside power source. A pressure-actuated indicating or recording controller is powered by surplus nitrogen gas drawn from the top of the nitrogen tank. In response to lading space temperature changes, sensed by the instrument's mercury-filled thermal element, the system modulates the nitrogen gas pressure through the controller, providing an output pressure signal directly proportional to the temperature response of the element.

The signal from the controller operates a Model 15 liquid valve, especially designed to overcome the problems associated with cryogenic temperatures which can be as low as minus 320 deg F in a liquid nitrogen system. The valve throttles the flow of nitrogen through the system. This combination of a pneumatic controller with liquid throttling valve is the control system used by Air Reduction in its "Cold Flow" liquid nitrogen system used on Rath Packing refrigerator cars.



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Report

(Continued from page 5)

tests, is composed of representatives from four railroads, six oil companies, four locomotive engine builders, and a representative of the Chief of Ordnance, U.S. Army. A field survey panel has inspected engines, engine parts, and lubricating and fuel oils in the course of determining service conditions and maintenance practices on seven representative railroads. The Committee has requested the CRC group to publish and regularly revise its manuals on Full-Scale Locomotive Test Techniques and CRC Rating. Because these are more comprehensive, the Committee feels they should replace MR-305.

Southern Emphasizes High Capacity, Profitability

Larger, lighter, and highly specialized freight cars are putting the Southern "on the right track to increasing its competitiveness, to increasing its usefulness to the public, and to having a larger and more profitable participation in the transportation business." That was how D. W. Brosnan, Southern president, described his railroad's equipment policies to *Railway Age* last month. He then told of even larger cars to come.

To bring to the rails traffic which is now moving in unregulated highway and barge carriers, it is necessary to have money-saving rates, good service, and equipment designed for the job it is to do. "We are interested in the full cost of transportation to the shipper, including those costs he must pay beyond the rail rate," Mr. Brosnan pointed out. "This might show up in crating and bracing, or in damage to his product. . . . If he incurs costs by rail and not by truck, rail haul is vulnerable.

"The designing of transportation services and supporting cars is handled by people in our pricing group. They're split into teams —one industrial engineer and one operating or transportation department man of the background of a division superintendent. They constitute a team and have access to a design group from the mechanical department, a costing group from transportation research, and a rate group from pricing," Mr. Brosnan said in explaining the operation of these task forces.

The Southern has five two-man teams working now. Their basic assignment is to tailor rail transport to shippers' requirements. Obtained are all details about a shipper's transport needs—how he loads and unloads, his general distribution pattern, the frequency of shipments, the size of shipments, and what kind of crating or bracing is used. "These studies are used to determine the kind of car needed to handle the product. If it requires protection from damage, it must be determined what kind of protection is needed. If heavy loading is involved, we must determine how much can be loaded into a car and how many receivers can take that quantity at one time," Mr. Brosnan explained. The criteria in determining if a special car design is needed is profitability. "Equipment is a part of pricing, even though it never had such a place in tradition-bound rate making," he said.

Types of Cars

The Southern operates 6,800 cu ft woodchip cars (RL&C, Oct. 1959, p 32); all-door box cars (RL&C, Sept. 1961, p 65); 85-ft box cars (RL&C, Jan. 1962, p 42); 50-ft, 70-ton wide-door box cars with 30-in. travel cushion underframes (RL&C, Jan. 1961, p 17); bulkheaded lumber flats; special container ore cars; special coke cars; carbon-electrode cars; 100-ton gondola and hopper cars in several styles for bulk materials such as coal, cement, grain, and other products, Trailer-Train and Flexi-Van piggybacks.

Orders for New Equipment
Placed Since Closing of July Issue

Freight-Car Orders

AMERICAN REFRIGERATOR TRANSIT. — *General American:* 200 RBL refrigerator-type cars with lading devices; unit cost $17,500.

CHESAPEAKE & OHIO.—*Pullman-Standard:* 70-ton, 4,000 cu ft covered hopper cars; delivery beginning in September.

CHICAGO & NORTH WESTERN.—*Pullman-Standard:* 100 70-ton covered hopper cars; delivery completed.

LOUISVILLE & NASHVILLE.—*General American:* 9 Dia-Flo covered hopper cars. On lease. Scheduled for October delivery. Directors have authorized purchase of 300 new box cars and modification of 200 older cars by South Louisville shops; cost $6,146,500.

NICKEL PLATE.—*General American:* 50 70-ton Airslide covered hoppers; delivery beginning September. *Greenville Steel Car:* Two heavy-duty flat cars, one of 200-ton capacity and one of 250-ton capacity; delivery in November.

SEABOARD AIR LINE.—*General American:* 25 70-ton covered hopper cars, 20 of Airslide type and 5 of Dia-Flo type; total cost $375,000, delivery in August and September.

WABASH.—*General American:* 20 Dia-Flo covered hopper cars. For delivery by Oct. 15. Company shops: 300 steel gondola cars. Estimated cost $1,305,000. Cars to be built from material and parts from 300 70-ton mill type gondola cars purchased from United States Railway Equipment Co.

WESTERN MARYLAND.—*Thrall:* 25 70-ton hopper cars with cushion-tube underframes, DF loading, roller bearings and Wabcopak brake units with composition shoes; unit cost $14,800.

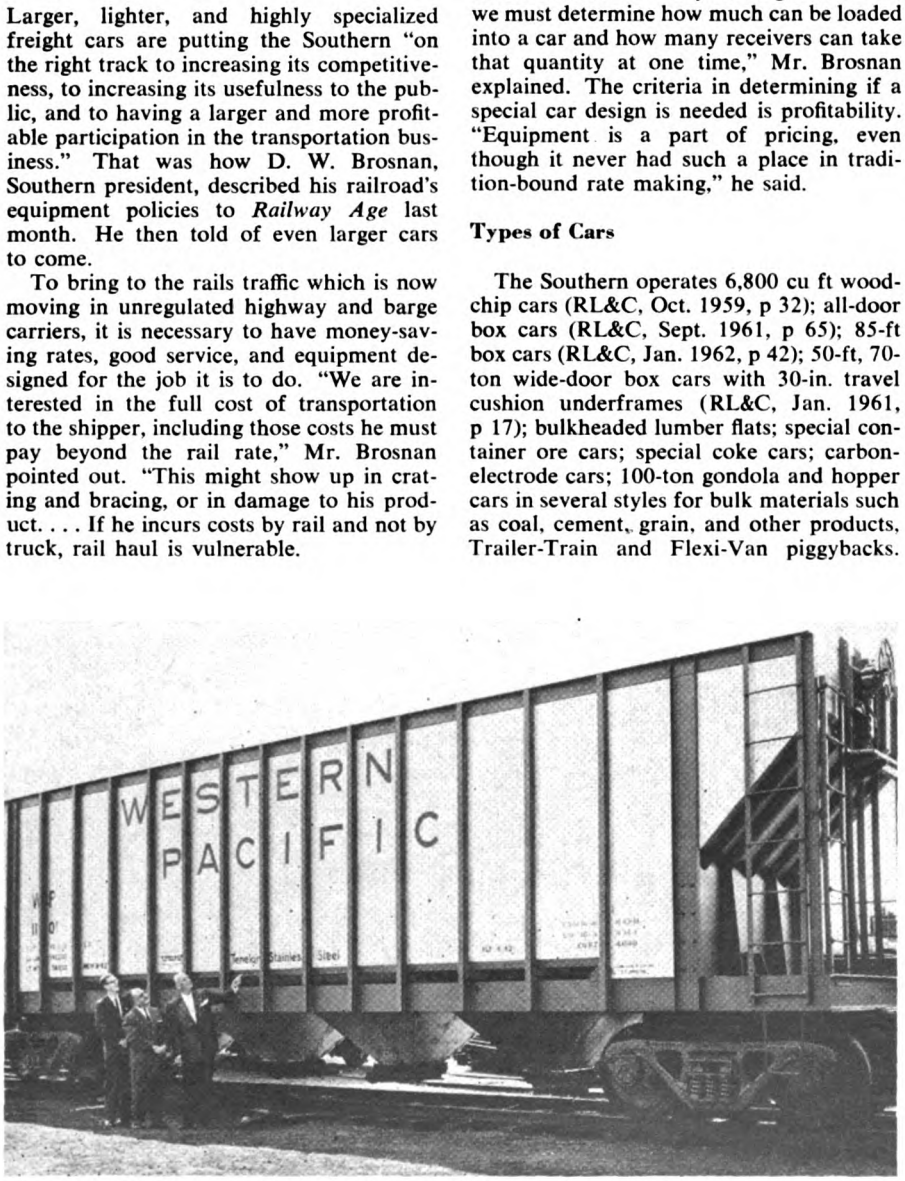
Notes and Inquiries

New York City Transit Authority has proposed purchase of 300 transit cars for BMT Division at cost of $37 million in 1963-1964 budget.

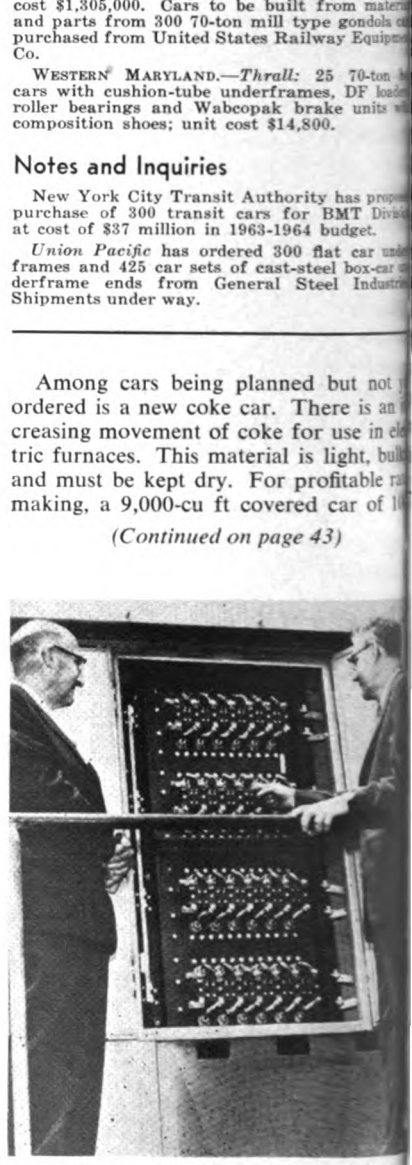
Union Pacific has ordered 300 flat car underframes and 425 car sets of cast-steel box-car underframe ends from General Steel Industries. Shipments under way.

Among cars being planned but not yet ordered is a new coke car. There is an increasing movement of coke for use in electric furnaces. This material is light, bulky and must be kept dry. For profitable rail making, a 9,000-cu ft covered car of 1

(Continued on page 43)

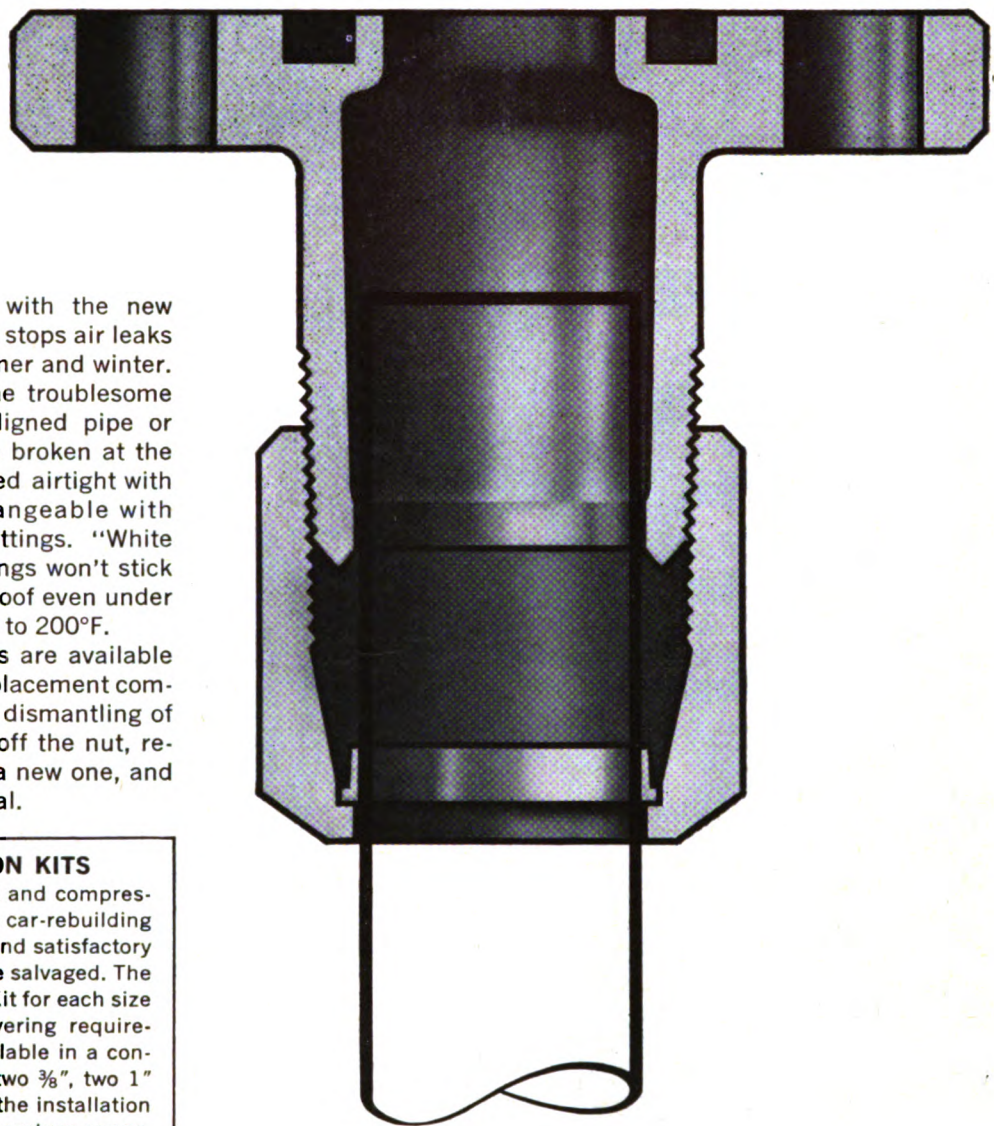


Western Pacific, first railroad to order Tenelon stainless steel covered hopper cars, has received the first unit of its 10-car order from Thrall. First car of this material was placed in experimental service by U.S. Steel last year (RL&C, May, 1961, p. 20). WP expects the three-compartment, 4,000-cu ft, "kitchen clean" interiors to yield substantial savings for shippers. The 50-deg slope sheets are designed to reduce unloading time, absence of center sill produces unobstructed opening above center discharge gates.



First silicon rectifier electric locomotive in U.S. has been put in service by Pennsylvania. It is one of 66 units being delivered by General Electric (RL&C, December 1960, p. 50). Instead of Ignitrons, unit has solid rectifiers which are inspected by Pennsy's W. O. Teufel (left).

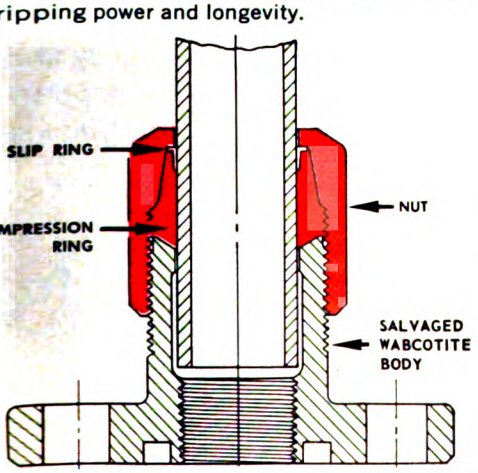
GRIPSEAL pipe fittings eliminate air line leaks



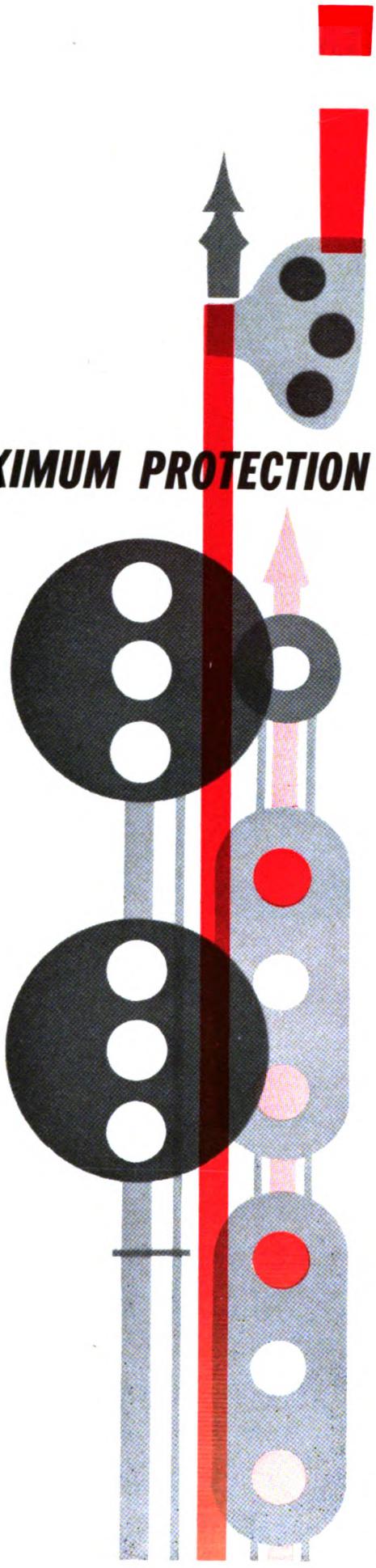
eplacing old style fittings with the new ripseal Flanged Pipe Fittings stops air leaks id retains air pressure summer and winter. ripseal Fittings overcome the troublesome oblem of connecting misaligned pipe or ightly short pipe. Even pipe broken at the readed section can be sealed airtight with ripseal. They are interchangeable with abcotite and Wabcoseal fittings. "White ark" rubber compression rings won't stick the nut—they remain leakproof even under xtreme temperatures of —50 to 200°F.
ripseal Flanged Pipe Fittings are available all pipe sizes—¼"-1¼". Replacement compression rings are split so no dismantling of ipe is necessary. Just back off the nut, remove the old ring and insert a new one, and ghten again for a positive seal.

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Consisting of the slip ring, nut and compression ring are available for use in car-rebuilding programs and are economical and satisfactory if Wabcotite body fittings can be salvaged. The three items are packaged as a Kit for each size of fitting. Conversion sets covering requirements for a single car are available in a convenient package consisting of two ⅜", two 1" and six ¾" Kits. They upgrade the installation to the new standards for temperature range, gripping power and longevity.

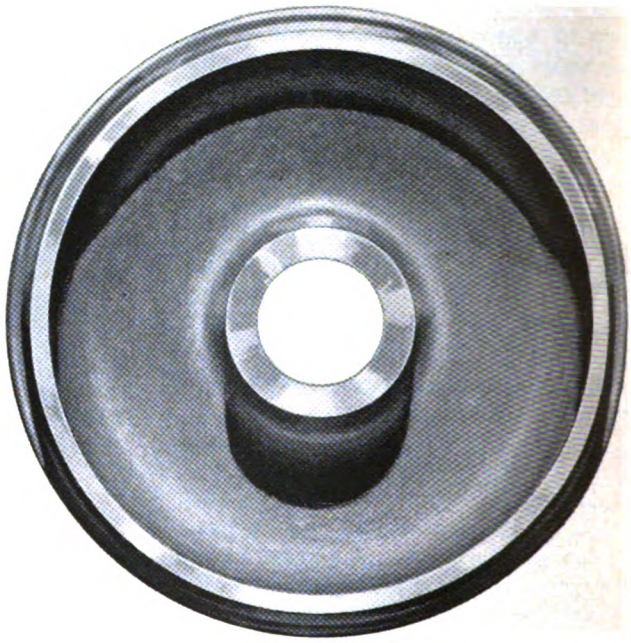


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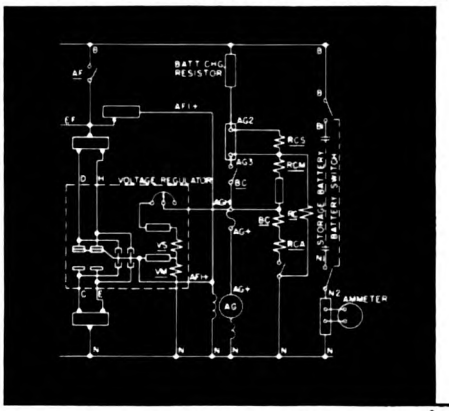
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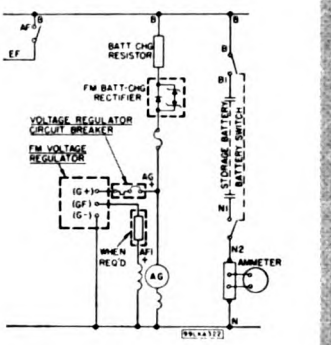
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Eliminate components containing moving parts subject to wear, burning and misadjustment.



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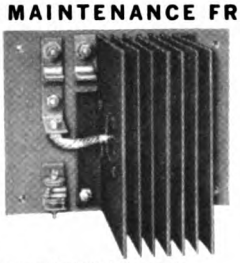
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apacity is required. While the design ot yet been completed, the Southern probably build some of these cars.

e road has also designed a bulk com- ty, open-top car with a single-unit body 0-ton capacity having no center sill. al trucks are required which are ex- ly heavy and reduce the ratio of pay- to dead load as compared to existing Articulation would provide the best s of getting a 200-ton car at the pres- This thinking could change with re- h which is now being carried on in esign of car trucks. The Southern no r is concentrating on 100-ton cars. already have them. We are now look- r a real 'profit stretcher' with the 200- b," Mr. Brosnan concluded.

e 1,200 gondola and covered hopper of 100-ton capacity with aluminum s (RL&C, April 1960, p 27, and June p 28, respectively) have been in serv- r 2½ yr. The aluminum body is in as good condition today as it was when rs were first built." There is no corro- nd little wear due to abrasion. Some e cars have been derailed and have up extremely well.

e principal wear on these cars is in the ls, Mr. Brosnan observed. The trucks draft gears will be the only parts that equire replacement within their 15-yr he believes. When due for wheel ges, the Southern expects to exchange s under them in order to speed up the and minimize the out-of-service time e cars.

the light of experience with its gon- dolas and covered hoppers, the Southern has developed no fixation on aluminum, steel, or any other metal for the 150-ton and 200-ton cars now planned. "We are looking for the best revenue producer obtainable to get the most dollars for the Southern at the lowest cost to our shippers. This will keep the Southern fully competitive with all other modes of transport—now and in the years ahead," Mr. Brosnan said. "We have open minds as to car designs and will quickly change to anything that offers better possibilities of enhancing our usefulness to the public by way of lower rates while producing profits for Southern.

"At the moment we are convinced that the best car stems from the use of aluminum bodies without center sills and with steel truck designs. Our new cars will not have center sills; they will utilize stub-end sills. The body of the car will serve as the center sill. This will permit lighter equipment and stronger equipment, with greater freedom from maintenance. The only wear will be in the trucks. It is conceivable that the time is not too far away when aluminum wheels with steel treads shrunk on will be utilized in order to further reduce the weight of equipment. The weight of cars is a very dynamic factor. High capacity, lightweight cars used in quick turnaround service, with proper pricing, are the key to profits. The steel people are now bestirring themselves and can easily come up with competitive lightweight car designs, especially if they engage design people with imagination and get away from the rutted path."



J. A. Welsch



L. E. Gingerich

J. A. Welsch Heads AAR Mechanical Division

J. A. Welsch, general superintendent motive power of the Illinois Central, was chosen chairman of the General Committee, of the AAR Mechanical Division at the June meeting (RL&C, July 1962, p. 23). L. E. Gingerich, chief mechanical officer of the Pennsylvania, became vice chairman. Terms of both offices are for two years. Elected as members of the General Committee for 2-yr terms in addition to Mr. Welsch are J. W. Hawthorne, chief mechanical officer, Atlantic Coast Line; D. S. Neuhart, general superintendent motive power and machinery, Union Pacific; T. T. Blickle, general manager—mechanical, Santa Fe; C. E. Pond, general superintendent motive power, Norfolk & Western; J. H. Heron, assistant vice president—equipment, New York Central; E. A. Kuhn, chief mechanical officer,

(Continued on page 45)



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E. C. Poole, in his new book* on railroad cost analysis (page 30) says that fuel consumption is the most satisfactory basis for allocation of expense of road locomotives, while engine-hours is the most accurate gage on which to distribute the expense of yard locomotives.

Whether you agree or not, you'll find informative and challenging the author's reasons for reaching this conclusion—and hundreds of others of equal importance, for attaining maximum earnings and efficiency on any railroad, including your own!

***COSTS—A TOOL OF RAILROAD MANAGEMENT**, published by Simmons-Boardman Publishing Corporation, 30 Church Street, New York 7, New York. 193 pages (8½ inches x 11 inches, soft bound) plus many charts and graphs. Price $6 per copy—liberal discounts for orders in quantity.

(Continued from page 43)

ltimore & Ohio; J. G. Moore, assistant e president, Southern; F. E. Russell, chief chanical officer — system, Southern Pac: and F. A. Upton, chief mechanical icer, Milwaukee.

Mr. Welsch, new Division chairman, rted to work for the Illinois Central in 16. He served as master mechanic, shop perintendent, superintendent of car dertment and superintendent of equipment or to becoming general superintendent of otive power in 1954. He has also served the Mechanical Division's General Comttee since 1954. Mr. Gingerich entered R service in 1923 and advanced through engineering department. He was assistt chief engineer—maintenance, prior to appointment as chief mechanical officer 1957 when he also became a member of General Committee.

IEE and IRE Form ew Electrical Society

erger of the Institute of Radio Engineers d the American Institute of Electrical igineers is expected to be completed on nuary 1, 1963. The new society, the Intute of Electrical and Electronic Engiers, has been in the process of formation r several years. Both of the parent groups ve now voted affirmatively on the merger. ie of the technical subdivisions of the EE is the Land Transportation Committ: which devotes much of its activity to oblems associated with electric traction railroads and transit lines. It is expected at this group will continue to function in e merged organization.

etters

AR Meeting

THE EDITOR:

Just finished reading the report on the AR Mechanical Division meeting in the ly 1962 issue and wish to compliment ur organization for doing an excellent job reporting. Naturally I was particularly terested in the section on wheels. [Mr. ederiks is chairman of the AAR Comittee on Wheels and Axles—*Editor*]. The verage of our Annual report certainly was mplete and concise. My only regret is that did not solicit your assistance in preparg our report. It is gratifying to know that e results of the Committee's work will get to the hands of many who otherwise ould not know of the changes taking place wheel designs and specifications.

T. R. Frederiks
Mechanical Engineer—Car
New York Central

ubricating Oil

TO THE EDITOR:

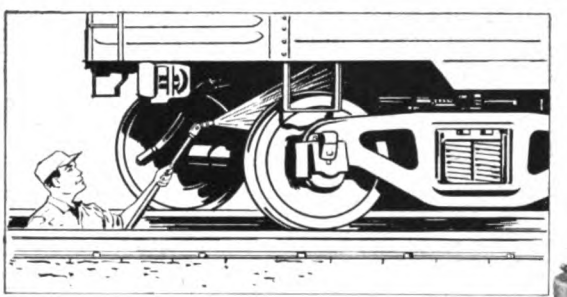
I read with interest the article in June sue of Railway Locomotives and Cars, entled "What Can Diesel Lubricating Oil ell," also editorial entifled "Needed—a Sherlock." It is my experience that the lube-oil samples from a diesel locomotive can tell you plenty about the condition of the engine if the test results are interpreted by a capable and experienced man. I can fully endorse Mr. Herzog's observations on the subject.

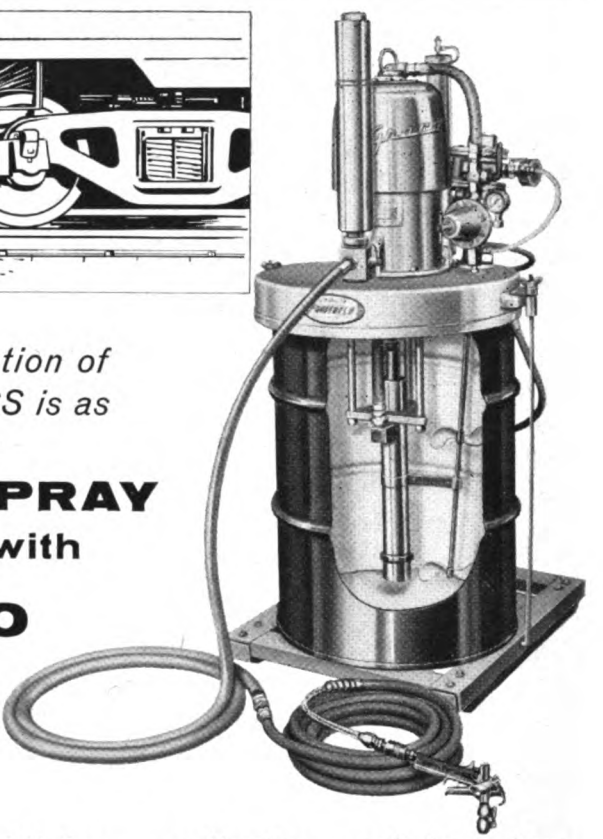
The operation of a railroad is greatly facilitated by use of signals. Consider the automatic signals along the right-of-way and the signals that crew members use to notify each other to stop, proceed, and slow down. Without signals there can be no effective teamwork on a railroad. So why should anyone deny himself the benefits of the signals that diesel lube-oil samples will furnish.

A physician can determine a great deal about the condition of a patient by checking samples of his blood. In much the same manner a sample of lube oil removed from the veins of a diesel engine can tell much about the condition of the engine. When you stop to think of it, how can lube oil *avoid* picking up useful information as it continually visits all of the wearing parts of a diesel engine?

Diesel lube-oil samples have important information for those who will listen, so more power to the test engineers whose duty it is to interpret the oil sample messages to the maintenance forces.

Gordon Taylor





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Houston Railroad Supply Co.
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T. F. & H. H. Going
6308 Limewood Circle

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NEW YORK—Newark, New Jersey
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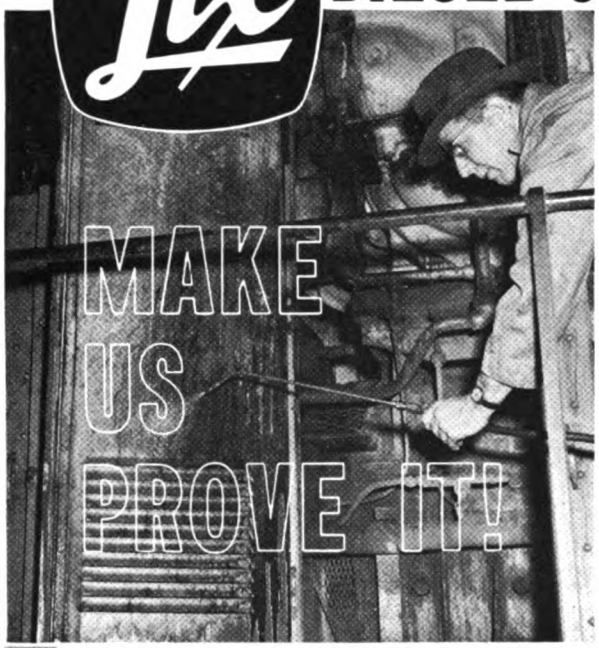
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MINNESOTA MINING & MANUFACTURING CO.—*William E. Marsden* appointed general sales manager, Adhesive Coatings and Sealers division, at St. Paul, Minn. Mr. Marsden formerly regional sales manager, abrasives division, Ridgefield, N. J.

■

TIMKEN ROLLER BEARING CO.—*Harley J. Urbach* elected vice-president—engineering, succeeding *Albert L. Bergstrom*, retired. *Ralph E. McKelvey* named director—engineering; succeeds Mr. Urbach.

■

LFM MANUFACTURING CO. — *Arthur H. Moorhead*, vice-president of sales, retired.

■

GLAS-KRAFT, INC.—Glas-Kraft, of Slatersville, R. I., has acquired all rights, manufacturing equipment, and inventory of "Standard" car door barricades formerly made by *Standard Railway Equipment Division of Stanray, Corp.*, Hammond, Ind. Glas-Kraft will manufacture this equipment under its own label.

■

AIR REDUCTION PACIFIC CO.— *E. P. MacCorkle, Jr.*, appointed president, succeeding *H. P. Etter*, retired.

■

BRENCO, INCORPORATED. — *John O'Brien* appointed sales engineer. Mr. O'Brien formerly research engineer with *AAR, with headquarters in Chicago.*

■

SIGNODE STEEL STRAPPING CO.—*R. E. Frase* appointed to newly created position of sales manager, Railroad Sales Division.

■

ELLCON - NATIONAL, INC. — *Robert Nitsch* appointed sales manager, with headquarters in New York.

■

UNITED SHOE MACHINERY CORP.—*Fred J. Cummings*, sales representative in western New England, named regional sales manager, New York territory, succeeding *F. W. Bowers* who has been moved to Boston to assist management.

■

FEDERAL-MOGUL-BOWER BEARINGS, INC.—*E. C. Jensen* appointed sales manager, Bower Roller Bearing Div.

OBITUARY

Walter F. Fauerbach, vice-president — sales, Motor Coils Manufacturing Co., Pittsburgh, Pa., died June 5.

ersonal Mention

igor & Aroostook.—*Northern Maine Junc-*
n, Me.: NELS E. SKOOG and DUANE L.
WSE named diesel supervisor and as-
ant diesel supervisor, respectively.

rida East Coast.—*New Smyrna Beach,*
.: I. E. SMITH appointed shop superin-
dent, locomotive shop. W. H. JAMES
d S. R. BAKER named general foremen.

een Bay & Western.—*Green Bay, Wis.:*
S. JOHNSON, superintendent, locomotive
partment, appointed superintendent —
chanical department. R. H. FISCHER ap-
nted general car foreman.

rthern Pacific.—*Seattle, Wash.:* M. W.
ONTGOMERY appointed assistant superin-
dent car department.

tario Northland.—*North Bay, Ont.:* T.
VLIN, acting general car foreman, ap-
inted general car foreman. J. T. HARD-
CKE, appointed supervisor of motive
wer. *Timmins, Ont.:* R. KERR appointed
omotive foreman, succeeding Mr. Hard-
cke. *Cochrane, Ont.:* M. SALIDAS, ma-
inist, appointed locomotive foreman, suc-
eding Mr. Kerr.

ck Island.—*Chicago:* D. L. WAITE ap-
inted mechanical engineer.

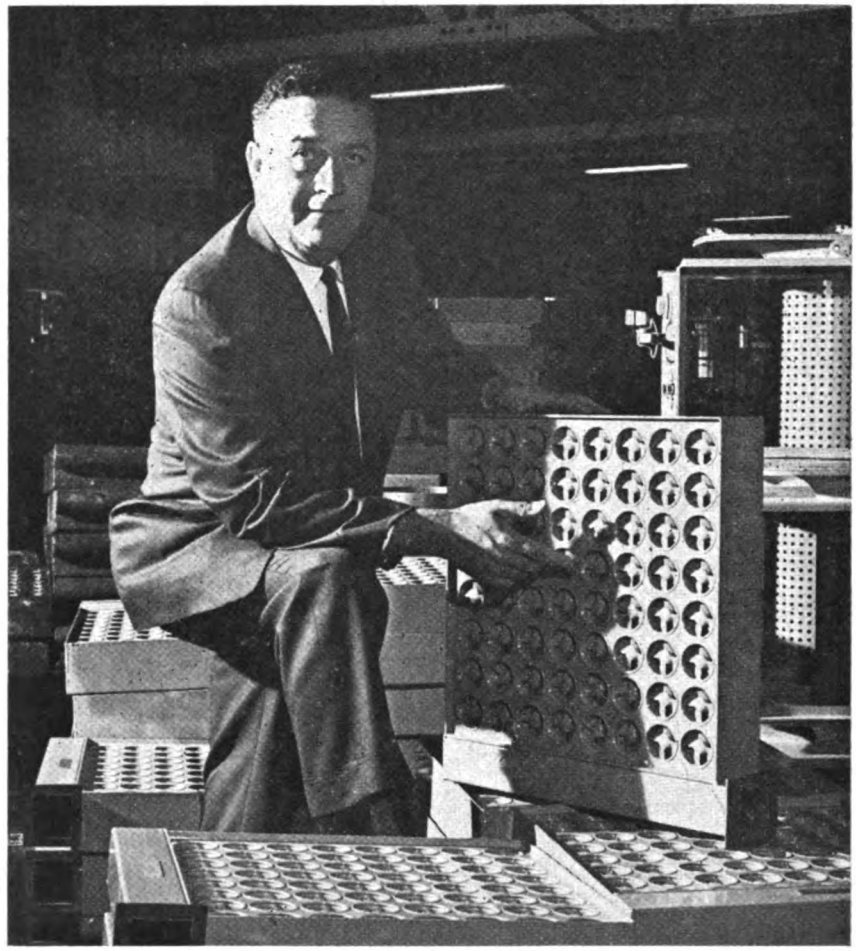
scoe, Snyder & Pacific.—*Roscoe, Tex.:*
B. SLOANE appointed superintendent of
ops.

uthern Pacific.—*Los Angeles, Calif.:* H. T.
NKERSON appointed superintendent of the
echanical department, Southern District.
G. MOORE appointed district master car
pairer, Southern District. *Sacramento,*
lif.: JOHN W. RONAN appointed assistant
perintendent of the mechanical depart-
ent, succeeding Mr. Ankerson. F. KIM-
LL appointed district master car repairer,
orthern District. *San Francisco, Calif.:*
Y PRUCHNICKI appointed chief traveling
esel supervisor, succeeding ELIOT POPE,
tired. Mr. Pruchnicki formerly supervisor
locomotive maintenance at Houston, Tex.
ICHAEL GOGOL appointed to newly cre-
ed position of assistant to the manager of
echanical engineering and research. Mr.
ogol formerly mechanical and test en-
neer at Houston. *Roseville, Calif.:* J. A.
URKE appointed master car repairer, Sac-
mento Division. *Tucson, Ariz.:* D. L.
ULBERTSON appointed road foreman of en-
nes. *El Paso, Tex.:* W. L. PREECE appoint-
d road foreman of engines.

Trade Publications

4. WATER - RESISTANT GREASES. Technical Bulletin A-3422 covers characteristics and typical data on all three Sun 2-890T greases. Sun Oil Co.

5. HELIWELD EQUIPMENT. Airco



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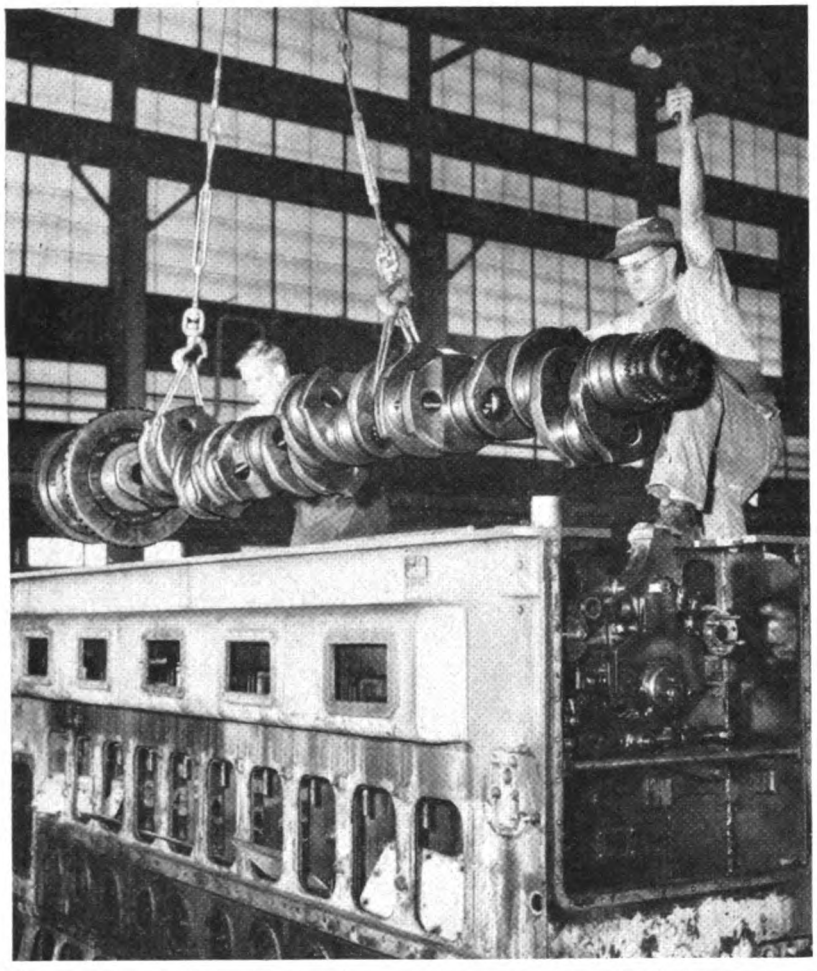
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Heliweld Equipment Catalog (Form ADC 7091) discusses all manual, semi-automatic and automatic equipment. Full line of accessory equipment, Heliweld tungsten electrodes, and filler wires also presented. Air Reduction Sales Co.

46. URETHANE FOAMS. Booklet furnishes general information on standard pour-in-place foams for insulation, structural, and cushioning uses. Standard product line foams—series "A" through "H" and "P"—described. Nopco Chemical Co.

47. BLAST CLEANING MACHINES. Bulletin 806 describes full line of rotating table-type Rotoblast cleaning equipment—from 4-ft table models up to largest centrifugal blast-cleaning rooms and cabinets. Pangborn Corp.

Reader Service

Reader Service Department — August, 1962
Railway Locomotives and Cars
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44 45 46 47

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Railroad .....

Company Address .....

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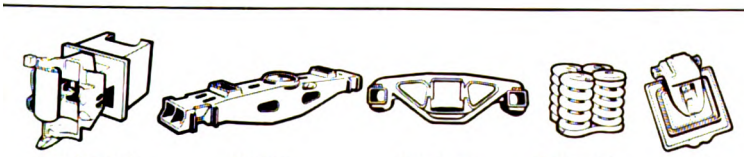


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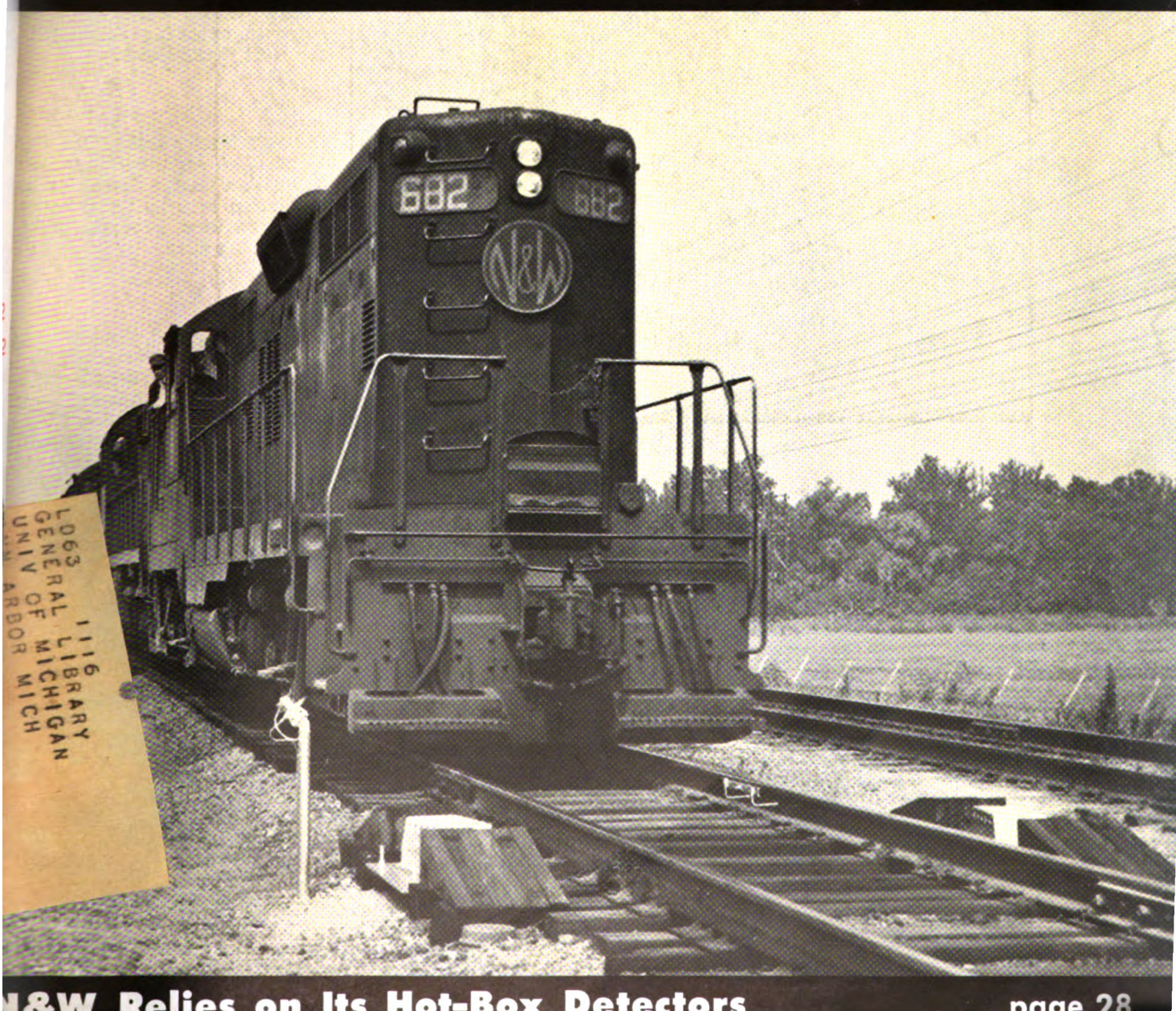
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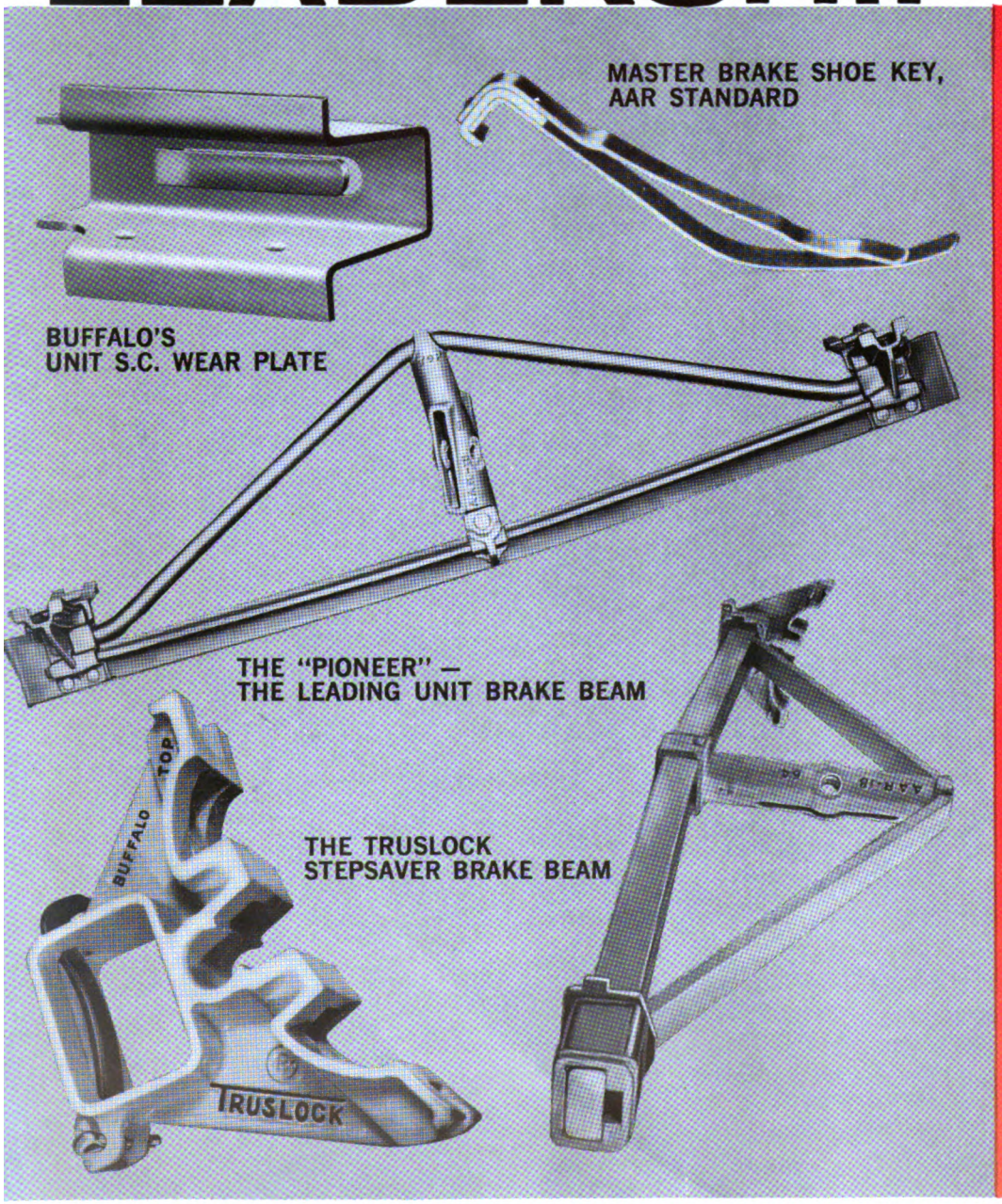
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N&W Relies on Its Hot-Box Detectors

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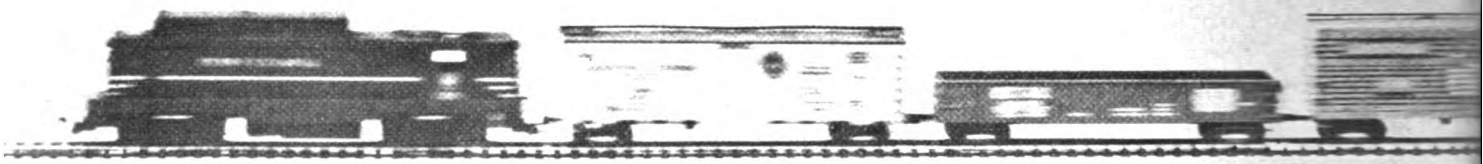
There are CP Impact Wrench models to handle all diesel engine service, to assemble and disassemble radiator sections, for traction motor overhaul and for Triple Valve maintenance. To arrange for a shop demonstration or get the latest data, write to: *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

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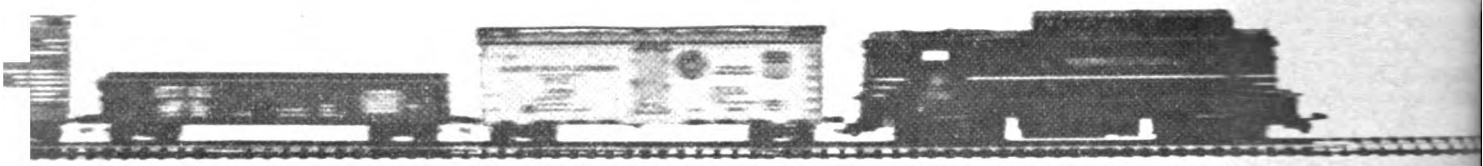
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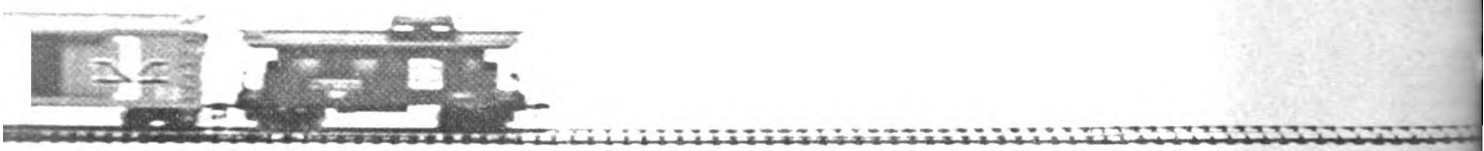
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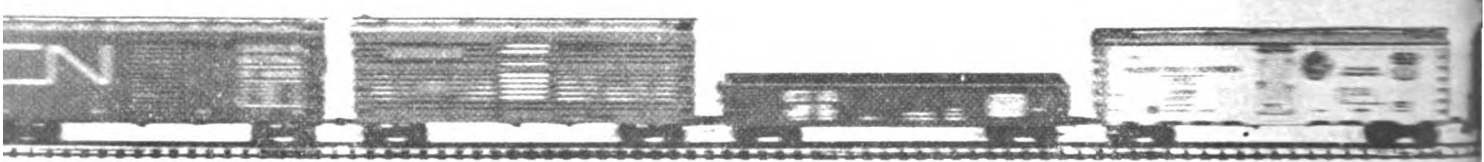
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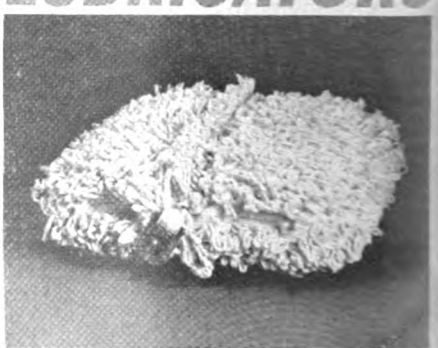
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America's Oldest Trade Paper

September, 1962—Vol. 136, No. 9

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REPORT FOR SEPTEMBER

1963 Meeting Dates Are Established

A tentative program for the October 1963 exhibits of the combined railway suppliers and for the meetings of the various railway organizations, including the mechanical department groups, has been issued by the Railway Supply Association. All activities are scheduled for Chicago from Wednesday, October 9, through Wednesday, October 16, 1963.

The meeting of the AAR Mechanical Division is to be held at the Hotel Morrison on October 9, 10, and 11. Groups making up the Coordinated Associations — Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations— all will hold their meetings at the Morrison on October 14, 15 and 16.

Indoor exhibits will be held at McCormick Place, the largest and newest of Chicago's convention halls, for the entire nine days, including Saturday and Sunday, October 12 and 13, when there will be no meetings. Outdoor exhibits, including all types of rolling stock, will be at the 31st Street Yard of the Illinois Central, in the same lake front area as McCormick Place. The 1961 Allied Railway Supply Association outdoor exhibit was also held at the IC's 31st Street Yard. Bus service will probably be provided between the various hotels and the two exhibit areas.

In addition to the Railway Supply Association, supplier organizations which have previously sponsored their own exhibits for other specialized railroad groups will participate. These include the Association of Track and Structure Suppliers, the National Railway Appliances Association, and the Railway Signal and Communications Suppliers Association. Railway organizations, in addition to the mechanical groups which will meet during the October 9-16 period, include the AAR Engineering, and Purchases and Stores Divisions, the AAR Communication and Signal Section, the American Railway Bridge and Building Association, and the Roadmasters and Maintenance of Way Association.

GM Appointed For Merged IEEE

Presidents of two major engineering societies slated for merger early next year have announced the appointment of Donald G. Fink as general manager of the newly formed Institute of Electrical and Electronic Engineers. Mr. Fink has been director of the Philco Scientific Laboratory.

The IEEE will be formed on January 1, 1963, when the American Institute of Electrical Engineers and the Institute of Radio Engineers merge. The AIEE Land Transportation Committee, a group mainly concerned with electric traction on the railroads, will continue to function in the IEEE organization. The IRE has had no group devoted primarily to railroad problems, although some railroaders have been active in the Vehicular Communications Committee.

Static Devices Gaining Popularity

Static devices are gaining in popularity both for car and locomotive applications, the Committee on Electrical Equipment—Rolling Stock reported at the June meeting of the AAR Mechanical Division. Typical of the development is a static lamp regulator for cars is to be available shortly. The economics of its application to locomotives, using a slightly cheaper lamp, is also being investigated. A study will also determine the economics of using this device to provide 30 volts d-c for sealed beam headlights without wasting power in dropping resistors and dimming controls.

Vapor expects soon to have a static ignition device for steam generators ready for field tests. It will invert 74 volts d-c into

(Continued on page 8)

TIME SAVING IDEAS FOR SEPTEMBER

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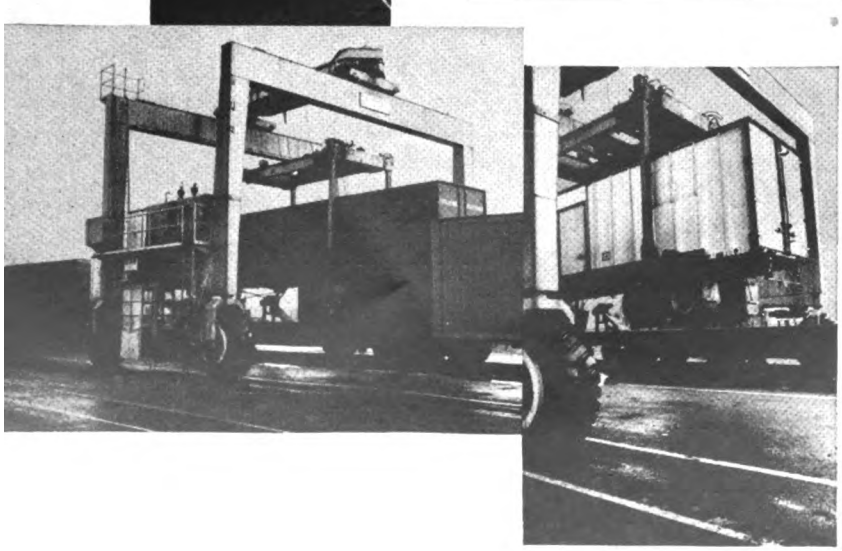


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gs. Straddling train and tractor. Got the trailer?
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Coordinated Associations Meet September 17-19

J. F. Nash, vice president-operations, New York Central, will be the speaker at the September 19 Railroad Presidents Luncheon, a regular feature of the Chicago meetings of the Coordinated Mechanical Associations. The luncheon and all sessions of the Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations will be held at the Sherman House. Programs of the individual associations appear below. A tour of the AAR Research Laboratory has been arranged for the afternoon of Wednesday, September 19, with all the coordinated groups participating.

Air Brake

MONDAY, SEPTEMBER 17

10 a.m.

Address—E. S. Marsh, president and chief executive officer, Santa Fe (in joint session with CDOA).
President's address.
Brakes for Freight Cars—Westinghouse Air Brake Co.

2 p.m.

Locomotive Air Compressor Synchronization—Central Air Brake Club.
Safety Control Arrangements for Locomotives—New York Air Brake Co.
Preliminary Test for AB Valve Body and Parts—Pittsburgh Air Brake Club.
26-C Brake Valve in 24-RL Schedule and Brake-Cylinder Release Valves—Montreal Air Brake Club.

TUESDAY, SEPTEMBER 18

9 a.m.

Joint session with CDOA:
Inspection, Testing, and Operation of Trains as Required by the Power Brake Law and Cold Weather and Its Effect on Train Operation.
Address—H. R. Longhurst, assistant director, Bureau Safety and Service, ICC.

2 p.m.

Election of Officers.
Question and Answer period.
Testing, Malfunction, and Remedies of 26-L Brake Equipment—Manhattan Air Brake Club.

WEDNESDAY, SEPTEMBER 19

9 a.m.

A Review of Appurtenances Added to the AB Freight Brake Equipment—St. Louis Air Brake Club.
Unifrate Variable-Load Brake for Freight-Car Trucks—American Steel Foundries.

Car Department Officers

MONDAY, SEPTEMBER 17

10 a.m.

Address—E. S. Marsh, president and chief executive officer, Santa Fe (in joint assembly with ABA).
President's address.

2 p.m.

Report—Committee on Road-Rail Transportation.
Report—Committee on AAR Loading Rules.
Report—Committee on Interchange and Billing for Repairs to Cars, TOFC Trailers and Containers.

TUESDAY, SEPTEMBER 18

9 a.m.

Joint Session with Air Brake Association:
Report—Committee on Light Repair Track and Train-Yard Operation.
Address—H. R. Longhurst, assistant director, Bureau Safety and Service, ICC.

2 p.m.

Report—Committee on Freight and Passenger Car Equipment:
1. Design, Maintenance, and Upgrading of Freight-Car Equipment.
2. Passenger-Car Maintenance.
Report—Committee on Painting.
Report—Committee on Maintenance and Servicing Mechanical Temperature Controlled Systems of Refrigerator Cars.

WEDNESDAY, SEPTEMBER 19

9 a.m.

Report—Committee on Wheels, Axles, and Wheel Shop Practices.
Report—Car Lubrication.
Comments—W. M. Keller, vice-president (research), AAR.
Miscellaneous reports.
Election of officers.

Locomotive Maintenance Officers

MONDAY, SEPTEMBER 17

10 a.m.

President's address.
Address—W. D. Dickie, chief of motive power and rolling stock, Canadian Pacific.
Fuel and Lube Oil. Topic: Analysis and solution to current diesel locomotive fuel and lube oil problems.

2 p.m.

Diesel Engine Maintenance. Topic: Relation of increased horsepower to diesel locomotive engine maintenance.
Shop Equipment. Topic: Spot System—New techniques for diesel locomotive repairs.

TUESDAY, SEPTEMBER 18

9 a.m.

Diesel Mechanical Maintenance—Other. Topic: Improved performance of diesel locomotive running gear.
New Developments in Motive-Power Maintenance. Topic: Application of cost control methods to diesel locomotive maintenance.

2 p.m.

Diesel Material Inventory and Control. Topic: Material inventory and control for lower diesel locomotive maintenance costs.
Diesel Electrical Maintenance. Topic: Economics of electrical maintenance of diesel locomotives.

WEDNESDAY, SEPTEMBER 19

8:30 a.m.

What Is Your Problem?—A panel discussion of diesel failures, causes and remedies.
Diesel-Hydraulic Locomotives (illustrated presentation)—P. V. Garin, manager, mechanical engineering and research, Southern Pacific.

Railway Fuel and Operating Officers

MONDAY, SEPTEMBER 17

10 a.m.

President's address.
Address—H. W. Large, vice-president, Pennsylvania.
Report—Safety; Cost Involved and Prevention of accidents.

2 p.m.

Report—Wheel Slip.
Panel discussion on Train Handling, including 24RL and 26L. Chairman—M. A. Davis, chief [illegible] foreman, Delaware & Hudson.

TUESDAY, SEPTEMBER 18

9:15 a.m.

Panel discussion on Loss and Damage Prevention. Chairman—O. [illegible] Teeter, assistant freight traffic manager, Denver & Rio Grande Western.
Operation of the U-25 GE 2,500-hp engine—General Electric Co.
Report—Elimination of Oil Marks and Classification Signals.

2:30 p.m.

Panel discussion on Terminal Delays and Yard Operation. Chairman—W. R. Foster, New York Central.
Proper Procedure in Conducting Investigations.
Report—Economy in Use of Fuel Oil.

WEDNESDAY, SEPTEMBER 19

9:30 a.m.

Panel discussion on Diesel Failures—Causes and Remedies, including steam-generator troubles. Chairman—C. Shipman, road supervisor of motive power and air brakes, Union Pacific.

Static Devices

(Continued from page 5)

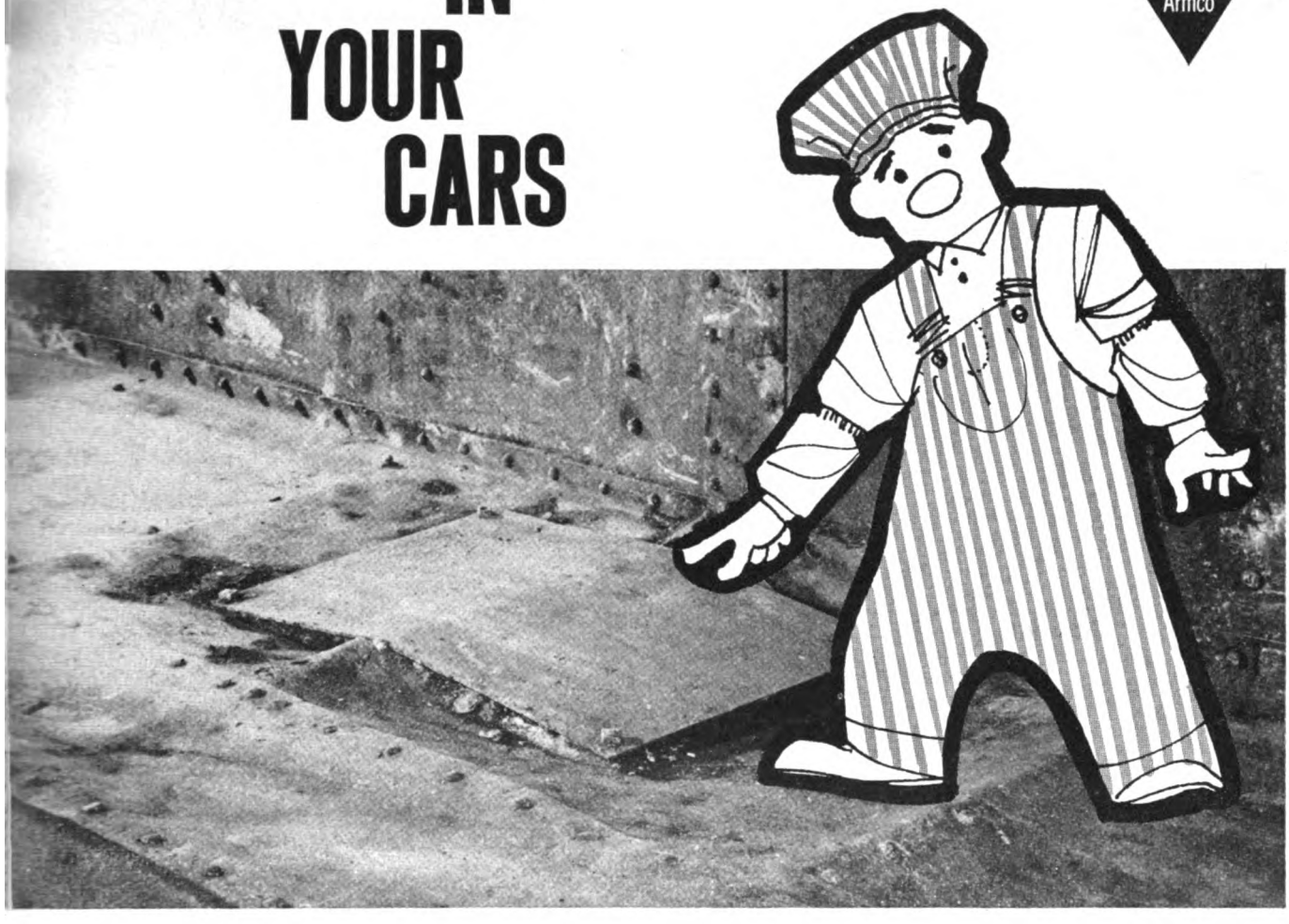
10,000 volts a-c with no moving parts. Static bell ringers are in service on the Canadian National and Canadian Pacific (RL&C, April 1962, p. 32). Only moving part, the ringer, is a 1-in. diameter 4-in. long steel plunger riding in a nylon sleeve. Designed to overcome freezing experienced with air-operated bell ringers, it is adaptable to existing bells.

Thermistor control of battery charging has been field tested for several years with promising results. It effectively varies battery charging voltage with changes in the battery's internal temperature. Gravity of the electrolyte is kept more constant and flushing intervals are extended considerably. The device can be used with Allis-Chalmers, Regohm, Safety and "black-box" regulators and can be adapted to GE and Westinghouse regulators with extra circuitry. The silicon diode reverse current relay and battery charging contactor are about to become standard. One road has about 50 on passenger cars and locomotives with some in service over two years. The failure rate approximates 1% per year.

(Continued on page 63)

LOOK IN YOUR CARS

New steels are born at Armco





How's your floor? If it's not holding up, switch to Armco Freight Car Flooring, it will solve the problem.

Armco Floors are alternate hat-shaped ribs of formed steel and wood planks. This combination provides strength, nailabilty and lading protection. Rugged design of these floors strengthens cars because steel ribs are welded to underframes.

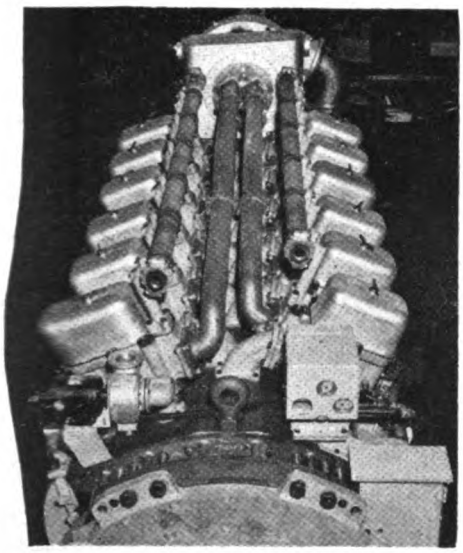
Armco engineers will design economical Armco Freight Car Flooring specifically for your cars. For the full story, call your nearby Armco Sales Office, or write **Armco Division, Armco Steel Corporation, 1582 Curtis Street, Middletown, Ohio.**

Steel

Symbol of economy, durability, strength.

ARMCO

Armco Division



Exhaust Manifold

Improved engine efficiency and lower maintenance costs are expected from the new gas-tight exhaust manifold developed for use on the Alco 12-cylinder Model 251 diesel engine. The gas-tight feature is achieved by elimination of slipping joints; by use of ring-like bellows at the turbocharger which provide for expansion and contraction during engine temperature changes, and by reduction in mating joints. No metal shroud is over the manifold, and each part can be removed individually for inspection and maintenance. The manifold is made of alloy cast iron. It has 10 major parts, instead of 28 as before; weighs about one-third less, and is mounted closer to the engine block. Open pipes mounted on either side of the manifold are water headers. Alco Products, Inc.

For more information, circle 9-1 on card following page 72.



Hydraulic Locomotives

Power-shifting and heavy-duty shaft drives feature the Plymouth CR Series of diesel-hydraulic locomotives in models from 40 to 120 tons, with wheel arrangements from 0-4-0 to 0-6-6-0 and engines to match power and speed requirements. The combination of power-shifting and diesel-hydraulic drive are said to give smoother power application, maximum continuous torque capacity at start, and no loss of load when shifting even under full engine power. Wheel-rails adhesion is said to be high. Plymouth Locomotive Works.

For more information, circle 9-2 on card following page 72.

Hopper Car Roof

Covered hopper cars, produced by installing MacGregor Opening and Self-Storing roofs (RL&C, July 1961, p 51) are soon to go into service handling rock salt. Utilizing the roof, which was designed for gondola and box cars, the covered hoppers, it is expected, can be loaded without stopping under the chutes. Following loading, the roof will be pulled into its closed position with an endless chain which joins the series of interlocking, watertight, ribbed-steel panels. The conventional hopper-car body is cut back at one end to accommodate the roof when in its retracted and folded position. Railroad Supply & Equipment, Inc.

For more information, circle 9-3 on card following page 72.



Cleaning Unit

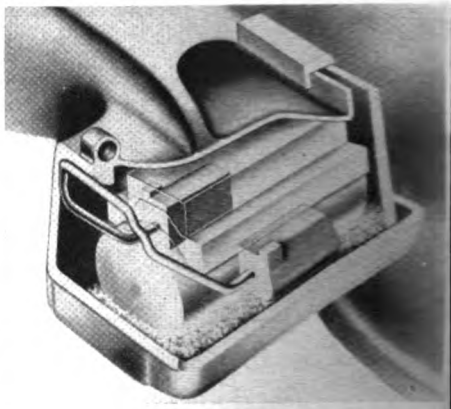
The striking force of a high-velocity jet stream, plus the scouring action of suspended abrasives, are combined in the Sellers Hydraulic Sand Jet which comprises a portable abrasive mixer, connected by flexible hose to a Super Booster hydraulic jet feed unit. Detergent, rust inhibitor, or chemical agent can be included in the cleaning stream. The Super Booster combines cold water and steam, forming a hot, high-pressure jet stream fed through a hose to an abrasive mixer. In the mixer, selected abrasive is continuously mixed with part of the jet stream piped to the top of the mixer. Recovered abrasive is dumped into the mixer at any time. A by-pass in the jet stream line connects with a pipe from the bottom of the mixer to pull the wet abrasive mix from the tank and carry it to a hose nozzle from which it is directed to the surfaces being cleaned. Amount of abrasive used is up to 1 lb per gal discharged by the hydraulic jet feed unit. Feed units range in capacity from 600 to 6000 gal/hr. The jet is said to be ideal for removing scale and grime from rolling stock and components. Sellers Injector Corp.

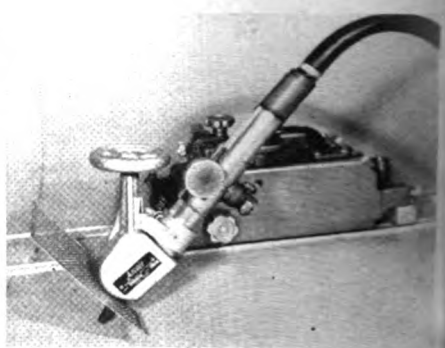
For more information, circle 9-4 on card following page 72.

Journal Stop

The Big Factor journal stop, for use in journal boxes with cast or welded waste retaining ribs, has been designed as a simple, one-piece device which holds axle movement to a minimum. The AAR approved journal stop is easily installed by jacking the box, removing brass and wedge, inserting journal stop, reinserting brass and wedge, and releasing jack. Inspection is needed only when brass is inspected. Chicago Railway Equipment Co.

For more information, circle 9-5 on card following page 72.





Semi-Automatic Torches

The Series 64-002 semi-automatic torches are designed primarily for fabrication or other applications where it is desired to mount the torch on a tractor or manipulator. They are said to be particularly suitable for weld seam preparation. Electrodes are loaded in rear and fed manually with hand wheel at top. Interchangeable shoes are available, making it adaptable to electrode sizes other than the one supplied. Arc-air Co.

For more information, circle 9-6 on card following page 72.



Repair Truck

The Bantam Rail-Roader, a repair truck designed for use in changing car wheels,

(Continued on page 13)



CHICAGO, BURLINGTON AND QUINCY HIGHBALLS WITH NATIONAL BRUSHES

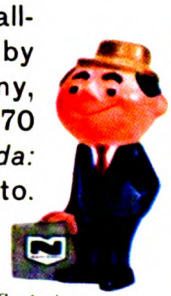
TRADE MARK

Starting at Lake Michigan, the 11,000-mile Burlington system serves an amazing complex of commerce and recreation—with connections to "Everywhere West."

Check a Burlington diesel anywhere on the system and chances are you will find "National" brushes on its traction motors and main generators. The system's high-speed service demands dependable commutation, which "National" brushes provide with minimum commutator maintenance.

The Burlington's original Zephyrs of the thirties were equipped with "National" brushes. Today these important components are used on the majority of the system's diesel units.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact Mr. National Carbon

UNION CARBIDE

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NATIONAL CARBON COMPANY

A GREAT NEW TRANSPORTATION TEAM...



ERIE-LACKAWANNA

A NATIONAL BRUSH USER SINCE 1947

TRADE MARK

From the merger of two great transportation systems has come the Erie-Lackawanna..."The Friendly Service Route"... vital to the industrial heart of the nation... from New York to Chicago.

"National" brushes were first used on traction motors and main generators in 1947. Fifteen years of experience has proven the value of their performance on equipment operating in a highly competitive transportation area.

Excellence of commutation, minimum commutator maintenance, and long life have resulted in the use of "National" brushes on a majority of the system's total diesel electric horsepower.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact Mr. National Carbon

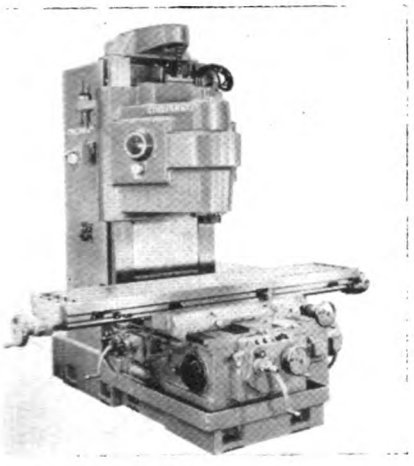
"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

(Continued from page 10)

couplers, etc., has mechanically operated dollies on front and rear, enabling it to travel to job site either over highway or on rails. It has a four-man crew compartment, 50-ton electrically driven mechanical jacks, and a 6,000-lb capacity hydraulic crane. The carrier features full reversing transmission for equal speeds forward-reverse for track operation. Schield Bantam Co.

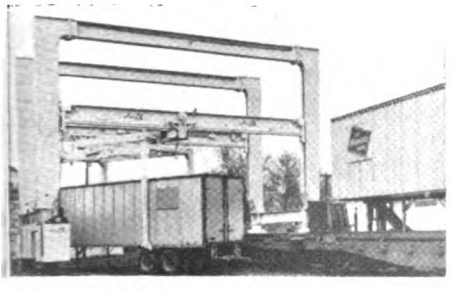
For more information, circle 9-7 on card following page 72.



Vertical Miller

The Cincinnati Vertical VerciPower features a large vertical spindle carrier mounted on wide, flat ways on the face of a rigid box column. Vertical traverse of the spindle carrier through 24 in., plus a wide selection of speeds and vertical feeds, give the machine more range and versatility than the vertical knee-and-column type. Feeds and speeds are changed by power from front and rear operating positions—32 feeds from ⅜ to 90 in. per min, longitudinal and cross, and from 3/32 to 22½ in. per min, vertical; 24 speeds from 16 to 1600 rpm on smaller machines, and from 14 to 1400 rpm on larger sizes. Power rapid traverse is 150 in. per min, longitudinal and cross, and 37½ in. per min, vertically. Cincinnati Milling Machine Co.

For more information, circle 9-8 on card following page 72.



Straddle Crane

The Travelift Model 800AC/all-hydraulic straddle crane, designed for piggyback and containerization, has a lifting capacity of 80,000 lb. It is powered either by a 122-hp gasoline engine, or by a 125-hp diesel. All hoses are fitted within the crane's framework to avoid snagging. Drott Manufacturing Corp.

For more information, circle 9-9 on card following page 72.



Rubber Products

New formulations that provide effective sealing through a 30% greater range of temperatures now are used in a major part of Westinghouse rubber products for freight and passenger brake equipment. Excellent sealing performance, it is said, has been obtained down to —50 deg F in northern areas and up to 200 deg F in thawing sheds. Identified by a "White Mark" molded on them, the gaskets, packing cups, and seals are manufactured to original-equipment dimensional standards. The White Mark on packing cups also denotes the addition of a protective coating which decreases friction, resists wear, and increases the brake-cylinder lubricant's ability to resist deterioration. All sizes of packing cups will be treated with this coating. Westinghouse Air Brake Co.

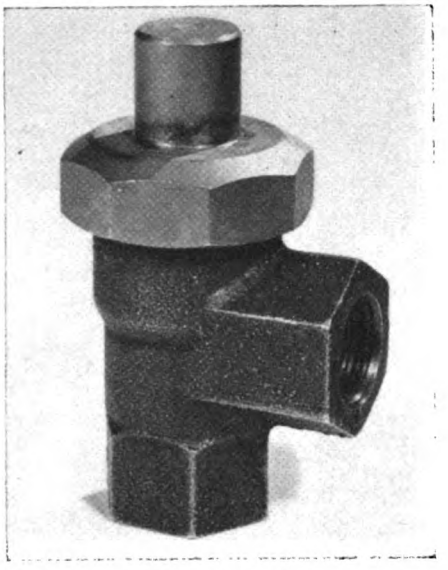
For more information, circle 9-10 on card following page 72.



Manual Hoist

A 3-ton Tugit lever-operated hoist with safety hooks, it is said, has made it possible to load one-third more Lark pick-up truck assemblies on multi-level cars. To snub the front and rear springs of the trucks before positioning them on multi-level cars, Studebaker-Packard constructed a welded drive-on ramp at the loading depot. A U-bolt was welded to a structural cross-member at the base of the ramp. The lower hook of the Tugit was snapped in place in the U-bolt and two slings with preformed attaching brackets were positioned in the upper hook of the Tugit and truck chassis frame. Several strokes of the hoist lever arm snubbed and held the truck springs in a predetermined position, while two U-bolts were installed on the truck suspension system in such a way as to hold the truck springs securely under tension. The truck was then driven onto the railroad car and the next truck positioned on the ramp. Manning, Maxwell & Moore, Inc.

For more information, circle 9-11 on card following page 72.



Thermal Drain Valve

The Type PP-39 self-contained, thermostatic valve, designed to protect the piping of the sanitary water system on passenger, baggage, or caboose cars from damage by freezing, also provides protection for piping from ice bunkers and flooded condensers on passenger cars. To drain the system when water temperature within the car drops, the valve starts to open at 39 deg F and is fully open at 33 deg F. It is furnished with ¾-in. pipe size female threads; is installed at the low point of the sanitary water piping within the car, and is piped to a tail pipe so arranged that it will not ice up and block the water flow. The valve, preset and sealed at the factory, is unaffected by water pressure. Ogontz Controls Co.

For more information, circle 9-12 on card following page 72.



Test Instrument

The Sonizon SO-300 is a battery operated, fully transistorized, ultrasonic testing instrument for measuring the thickness of such metals as steel, cast iron, aluminum, and magnesium. By placing a probe on the sur-

(Continued on page 17)





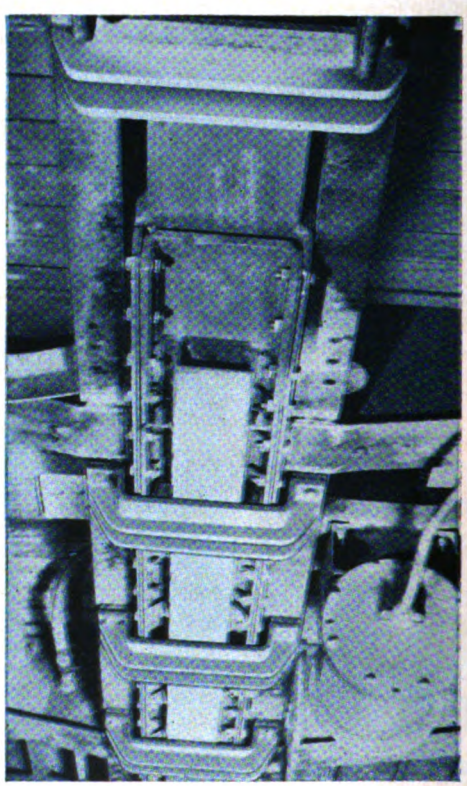
What are you doing about the bump, bump . . . the thump, thump of end-to-end impacts that play hob with lading, that stress and mash your car structures? They're costing you money right now. Don't just look away because they don't just go away.

Fortunately, there's something you can do about these destructive forces. *You can now equip existing cars or order your new cars with National 3C Gliding Sills.*

Results are startling. Lading forces are drastically reduced and damage claims plummet . . . bad-order cars, from end-to-end impacts, become just a memory.

A box or flat car equipped with 3C, operators tell us, ". . . could pay for itself in two years." From then on *you're on velvet — with the National 3C Gliding Sill.*

Existing cars with standard AAR "Z" center sill construction can be modified easily, economically to provide the Glide Ride with the National 3C. Package includes hydraulically cushioned sliding center sill with 24-inch travel in either direction. National 3C uses AAR standard couplers.



Transportation Products Division

International Division
Cleveland 6, Ohio

National Castings Company
of Canada, Ltd.
66 Portland St., Toronto 2B, Ontario

NATIONAL CASTINGS COMPANY

Cleveland 6, Ohio

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES • ROLLER BEARING ADAPTERS • NATIONAL SPEEDLOADER CONTAINER HANDLING SY

Any existing car or new car with AAR standard center sill construction can now

CHANGE RIDING TO GLIDING WITH NATIONAL 3C* GLIDING SILL PACKAGE

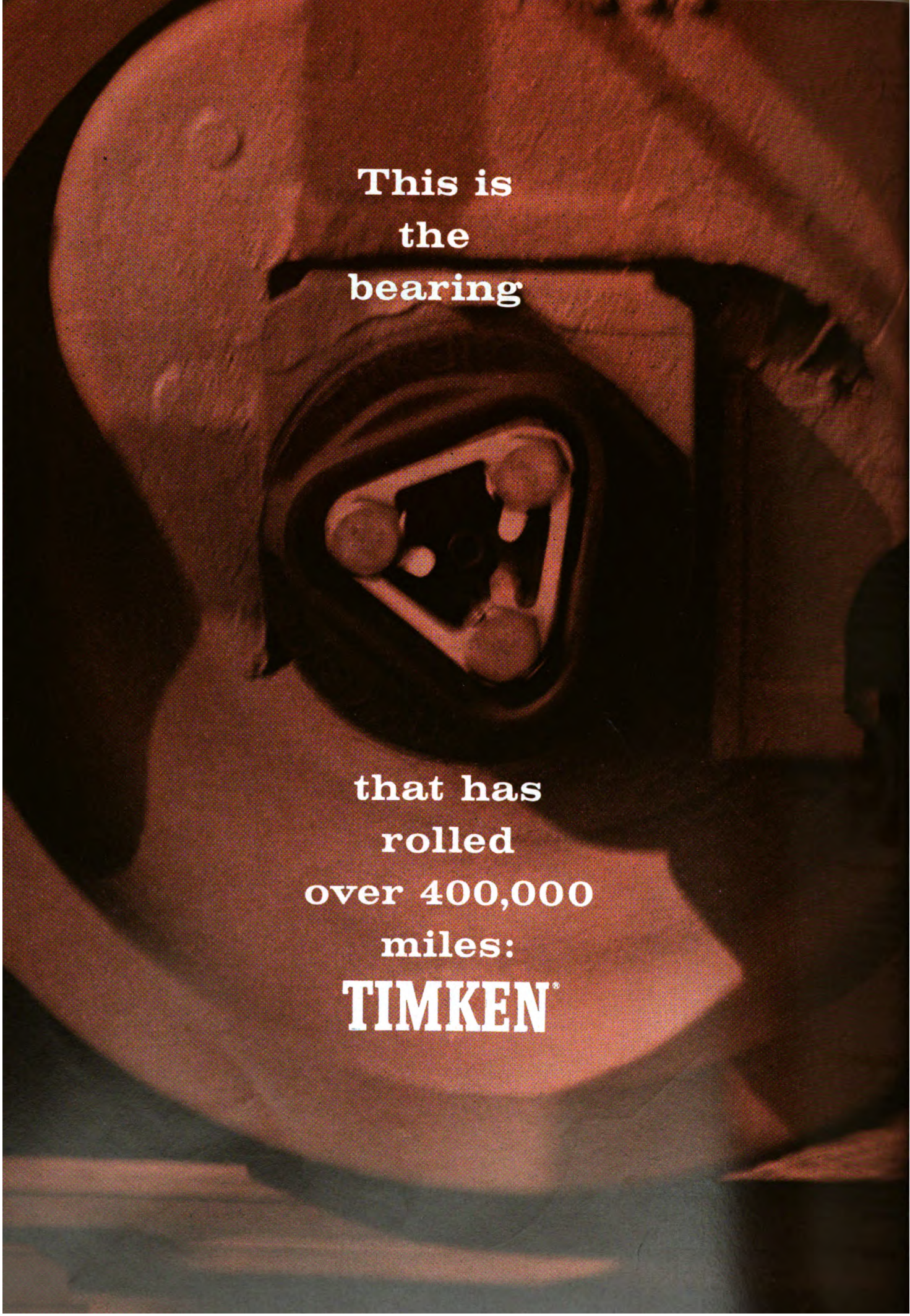
3C hydraulic unit responds only to dynamic forces... operates only when protection is needed...

REDUCES LADING FORCES UP TO 82%



LEARNED TO PROTECT
P R I
MEMBER

*Cushioned Cargo Car that Cuts Cargo Claims


This is
the
bearing
that has
rolled
over 400,000
miles:
TIMKEN®

(Continued from page 13)

face to be measured and turning a knob, reading is instantaneous, without audio or meter reference. Magnaflux Corp.

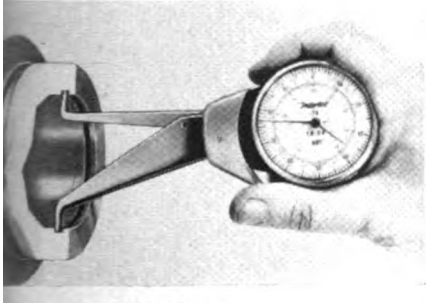
For more information, circle 9-13 on card following page 72.



Airless Spray Unit

A "paint shop on wheels," a dolly-mounted unit, includes a VersaSpray Airless unit and electric- or gasoline-driven compressor to operate the motor of the high-pressure paint pump. The unit is said to be ideal for production work where painting is done in several places within a shop and for maintenance painting of all kinds. Nordson Corp.

For more information, circle 9-14 on card following page 72.



Internal Caliper

Scissor action of Intertest, a dial reading measurement device, makes it easy to read internal dimensions, including offsets and grooves, in thousandths of an inch. The device is available in eight models. The smallest has a range from 0.2 to 0.6 in.; the largest, from 2.4 to 3.2 in. Dyer Co.

For more information, circle 9-15 on card following page 72.

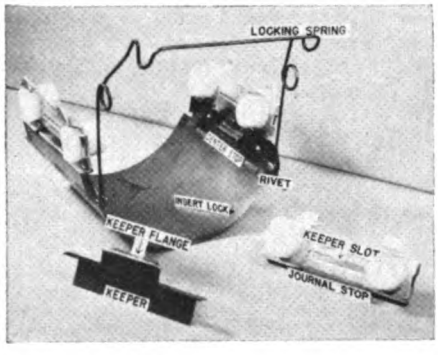
Highway Repair Truck

On-the-spot repairs and derailments are being handled on the Chesapeake & Ohio with "Big Bertha," a six-wheel drive Straddle-Track-Carrier which can travel over highways at speeds up to 40 mph, through fields, and on rough ground. With its crew of four, it is said, derailments which formerly required at least 8 hr can be cleared up in less than 3 hr. Travel time also is said to be a fraction of the time taken to assemble and



dispatch repair equipment traveling on rails. The carrier is equipped with a 360-deg, 6-ton bridge hoist, a compressor for use with air jacks, a 30,000-lb front-mounted winch, four hydraulic outriggers, and floodlights on hoist boom and cab roof. The C&O has added two 75-ton air jacks, butterfly re-railers, two freight car trucks, two step jacks, spare journal bearings, and miscellaneous tools. FWD Corp.

For more information, circle 9-16 on card following page 72.



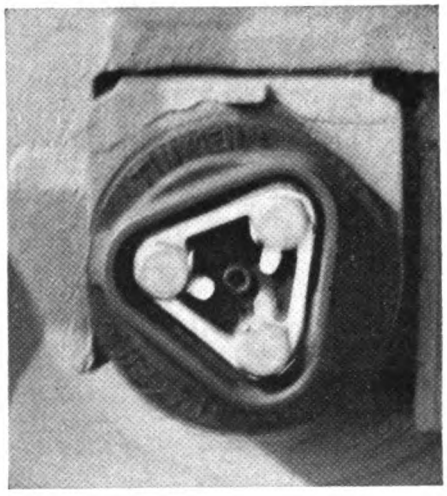
Journal Stop

The Optimum Journal Stop has passed AAR laboratory tests and is approved for test application. The Optimum Lubricator Insert, furnished with keepers welded in place and with a special locking spring, is used to hold the journal stop in place. The lightweight stops, with size stamped on frame, are easily applied by merely raising the journal box and placing the stop on the keeper on each side of the journal. Railway Service & Supply Corp.

For more information, circle 9-17 on card following page 72.

Hose Cutter

With the Band-It hose cutter, two-wire braided hose up to 1¼ in. is cut instantly with no flying debris. The cutter slices through insulated electrical cable, wire-braid, and non-wire braid hose without binding and without frayed or ragged ends. It may also be used for cutting plastic tubing, plastic pipe, insulated electrical cable, and rope. It is furnished without motor, pulley, guard or belt, and the shaft may be equipped either with a pulley or flexible drive shaft. A ¾-hp motor is recommended for cutting wire-braid hose up to and including 1½-in. two-wire braid hose; a ½-hp



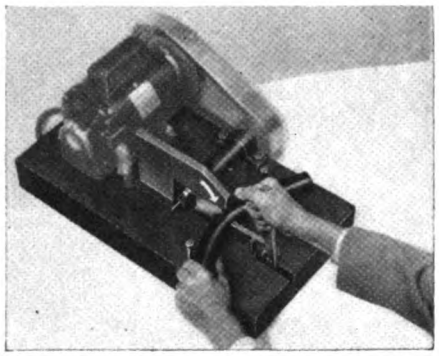
OVER
400,000

Many Timken® bearings have rolled up more than 400,000 trouble-free miles on piggy-back service between New York and San Francisco. This high-speed, heavy-duty service record proves again that Timken tapered roller bearings are one of the best investments railroads can make. Timken bearings improve profits by solving the hot box problem—assuring faster, more dependable delivery—cutting lubrication costs and reducing terminal bearing inspection time.

Made from our own fine nickel-rich steel in a plant devoted strictly to railroad bearings, Timken heavy-duty "AP" bearings combine ruggedness and precision to give you long life and top performance. This is the bearing that rolls an average of over one hundred million car miles between car setouts due to overheating. This is the anti-friction journal bearing that is used by 110 railroads and private car owners.

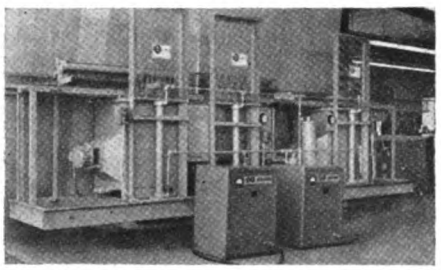
Join the switch to "Roller Freight". Over 92,000 cars are rolling on Timken bearings and the number is increasing every day. The Timken Roller Bearing Company, Canton 6, Ohio. Also makers of Fine Alloy Steel and Removable Rock Bits.

QUALITY TURNS
ON HEAVY DUTY
TIMKEN®
TAPERED ROLLER BEARINGS



motor for light service, and ¾ or 1 hp for all purposes. Band-It Co.

For more information, circle 9-18 on card following page 72.



Cleaning Tanks

The cleaning unit illustrated was built to meet a specific customer's need. It is a fully automatic, self-feeding and self-ejecting unit, consisting of an agitated Turco Turbulator tank in the first stage, an ultrasonic cleaning tank in the second stage, and a Turbulator rinse tank in the third stage. It was designed to vibrate soils away from inaccessible areas in fuel pumps and injectors, governors, bearings, and other components. The Turbulator tank automatically alternates among four different flow patterns during each cleaning cycle. Tanks are available in 14 standard sizes—seven for cube baskets and seven for rectangular baskets. The square tanks have two propellers, facing each other on opposite walls of the tank. The rectangular tanks have four propellers, in sets of two, similarly facing each other. Turco Products, Inc.

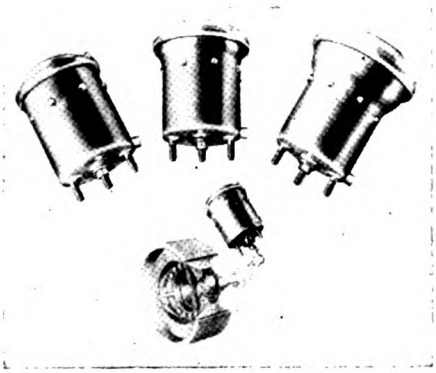
For more information, circle 9-19 on card following page 72.



Terminal Blocks

The Termi-Blok for use on motive power is designed to permit high-density power and control circuiting and power distribution, with no tools needed for circuit connections and changes. It replaces terminal and barrier boards presently in use in switchboards, panel boards, and power control, and permits front loading of circuit wires. Tab terminals, compression crimped to circuit wires by a mated AMP hand tool, can be inserted directly into three- or six-circuit common slotted modules and can be extracted without adjusting screws or bolts. The 35-amp block will handle 10-22 AWG wire sizes. American Pamcor, Inc.

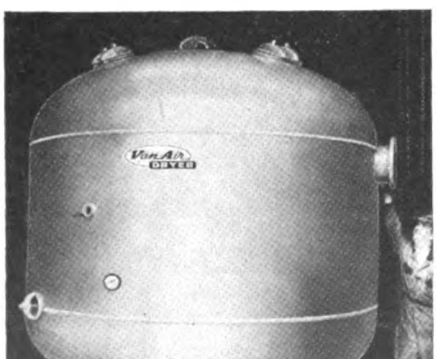
For more information, circle 9-20 on card following page 72.



Parking Brake

The direct-mounted Maxibrake safety and parking brake has been approved by the California Highway Patrol and accepted by the ICC for use on trucks, trailers, buses, and off-road vehicles using air-brake systems. The brake, which operates automatically when loss or decrease of air pressure would ordinarily result in brake failure, can be installed both on new and existing equipment. Illustrated are three models for replacing 24-, 30- and 36-in. service brake chambers, also one showing positioning of the "tamper-proof" spring-applied Maxibrake. The Push-to-Apply, Pull-to-Release button on the Maxibrake control valve mounted on the dash of vehicles equipped with the Maxibrake gives the operator constant control without leaving the cab. Gustin-Bacon Brake Co.

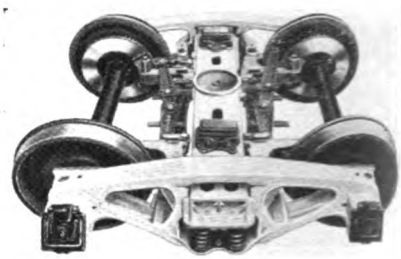
For more information, circle 9-21 on card following page 72.



Air Dryers

Clean, dry, non-toxic air from Van-Air Dryers is said to cost only one cent per 18,000 cu ft of air processed. Forty models range from 7.5 to 12,000 cfm capacity at 100 psi. Van Products Co.

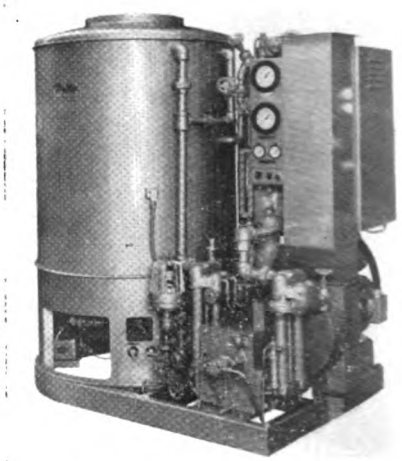
For more information, circle 9-22 on card following page 72.



Mechanical Disc Brake

Brake X, a mechanical disc brake for freight cars, is now available in two new models—one for trucks with 36-in. diameter wheels used under freight cars of 100-ton capacity and one for trucks with 28-in. diameter wheels used under low-deck piggyback cars of 70-ton capacity. The brake, first introduced in 1956 for the standard 33-in. wheel truck, has four single-surface braking discs on which composition brake blocks act. The brake is powered by the conventional body-mounted air-brake cylinder which operates truck brakes through conventional rod-and-lever system. Equalizer bars tie the two truck side frames together on their center line. Brakehead arms, with face plate and brake blocks, are suspended on integrally cast side-frame brackets by rolled-steel hanger pins. Discs of special friction iron are bolted to each wheel hub. Buffalo Brake Beam Co.

For more information, circle 9-23 on card following page 72.



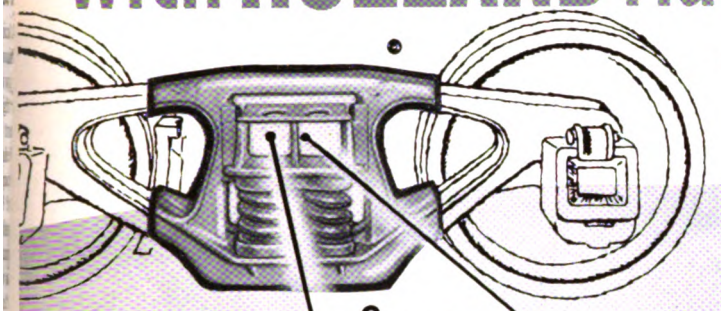
Steam Generator

The Clayton steam generator for diesel trains is said to deliver dry saturated steam to the trainline at all times, no superheated steam or liquid being delivered into the trainline under starting or fluctuating loads. Burned-out couplings are also eliminated. Outside surface of the generator is controlled to 40 deg F rise above ambient for safety of operating personnel. Diaphragms in the packless diaphragm pump can be replaced at scheduled maintenance periods rather than during critical demand periods. The generator produces more than 1 lb of steam per hr per lb of boiler weight. A balanced feed control delivers water to the heating section in advance of high steam demand, and a ring thermostat integral with the tube protects against excessive

(Continued on page 58)

all these CAR TRUCKS should be MODERNIZED with HOLLAND ride stabilizers RS-2

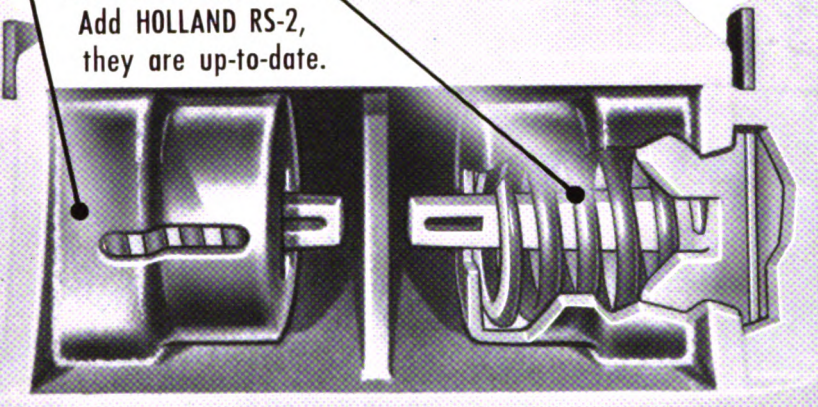
DOUBLE TRUSS SELF ALIGNING
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DALMAN 1 & 2 LEVEL DESIGN
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... at a fraction of New Truck cost

... give these trucks all the important Advantages of Latest High Speed Types

Only the bolster ends are out-of-date! Add HOLLAND RS-2, they are up-to-date.



Now, on over 13,000 freight car trucks HOLLAND Ride Stabilizer Units are providing all of the advantages of "Built-In" stabilization for high speed operations.

CONVERSION ECONOMY
Save over 80 percent of the cost of a new truck.

PERMANENCE
Housings of steel, welded-in steel bolsters, become an integral part of the bolster ends.

SIMPLE, ACCURATE INSTALLATION
Restores fit between bolster and side frame. Our engineers will assist.

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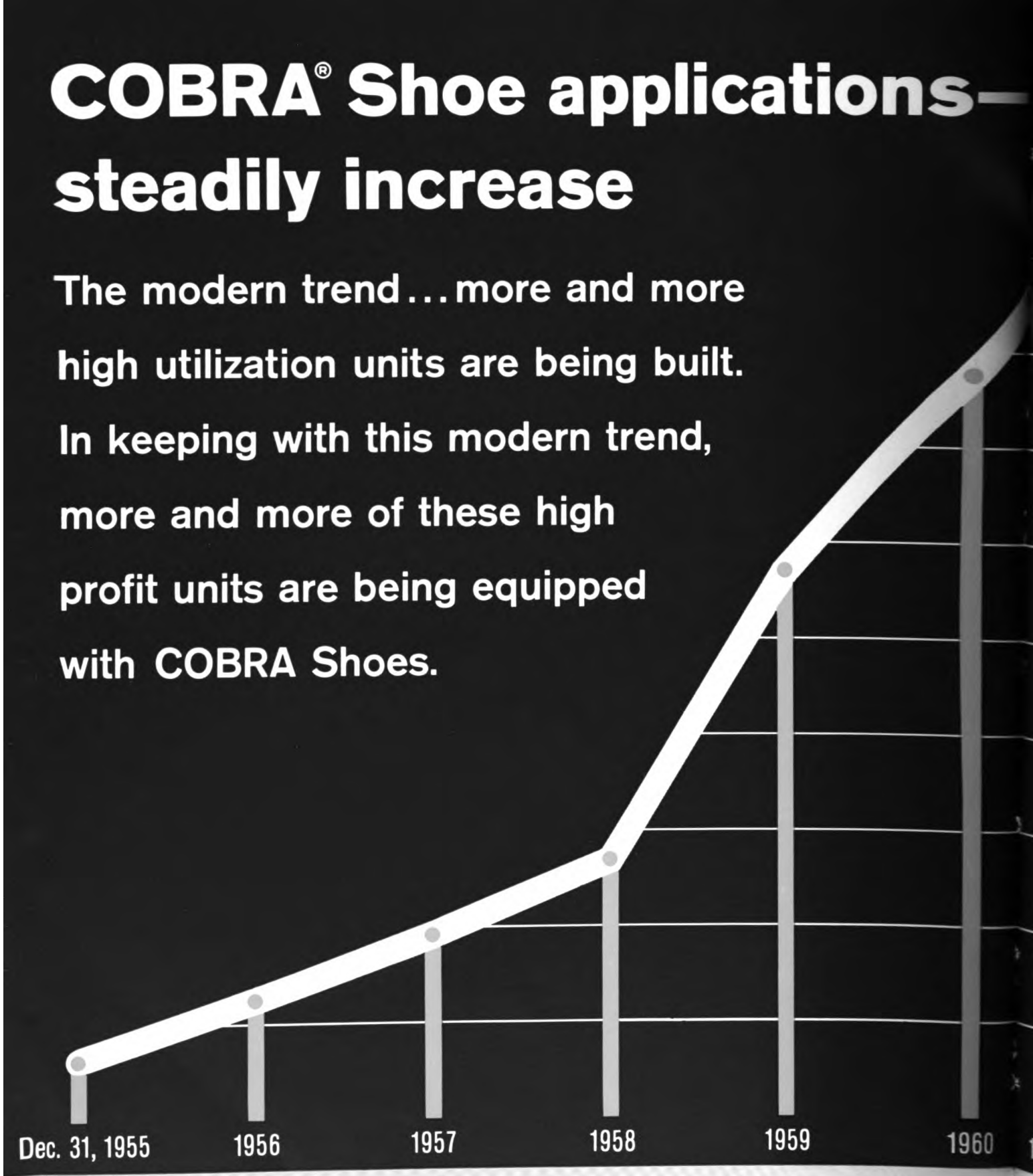
332 S. Michigan Ave., Chicago 4, Ill.

Ride Stabilizers or Volute Snubber Springs for the finest in freight car truck controls.

430

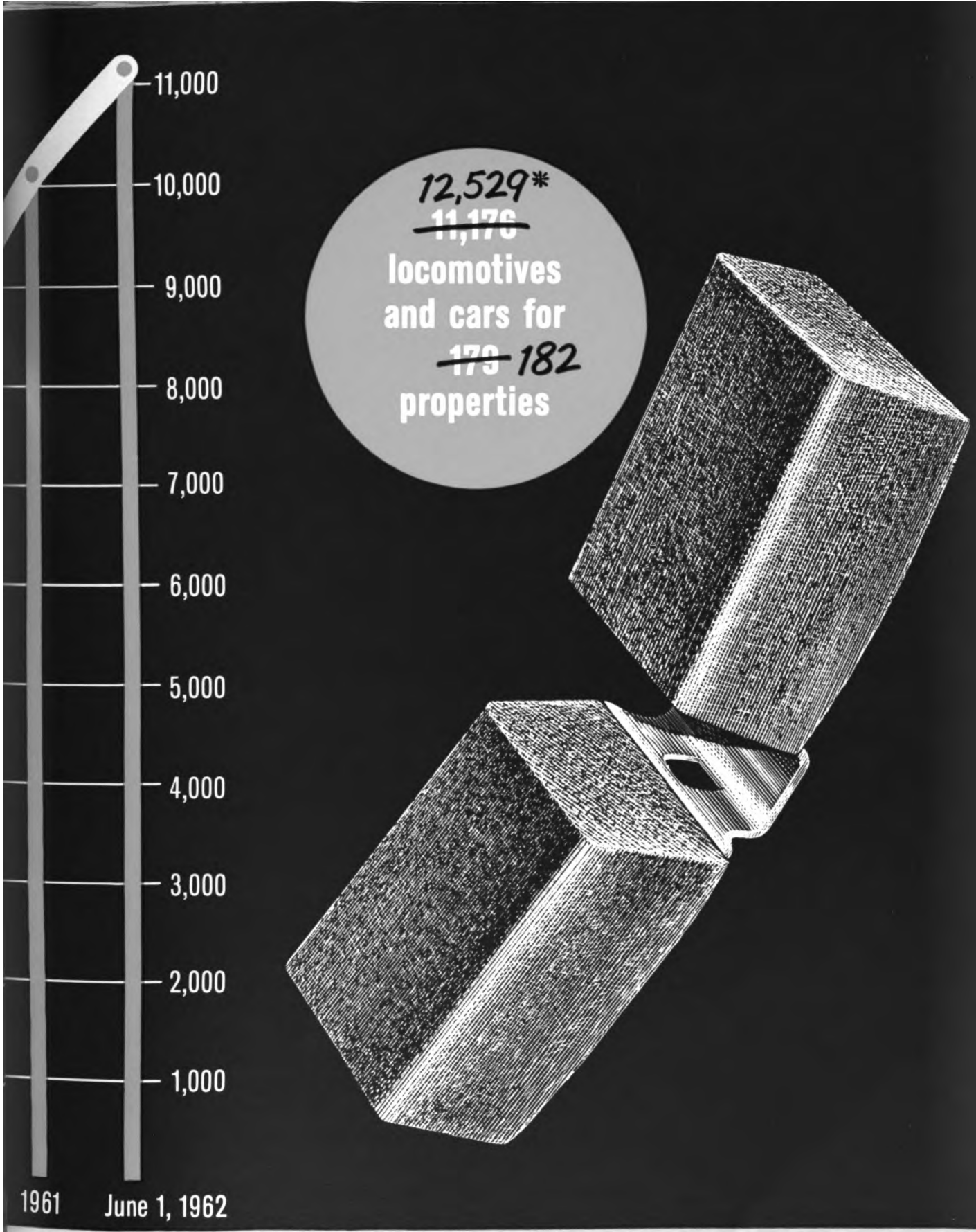
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The modern trend... more and more high utilization units are being built. In keeping with this modern trend, more and more of these high profit units are being equipped with COBRA Shoes.



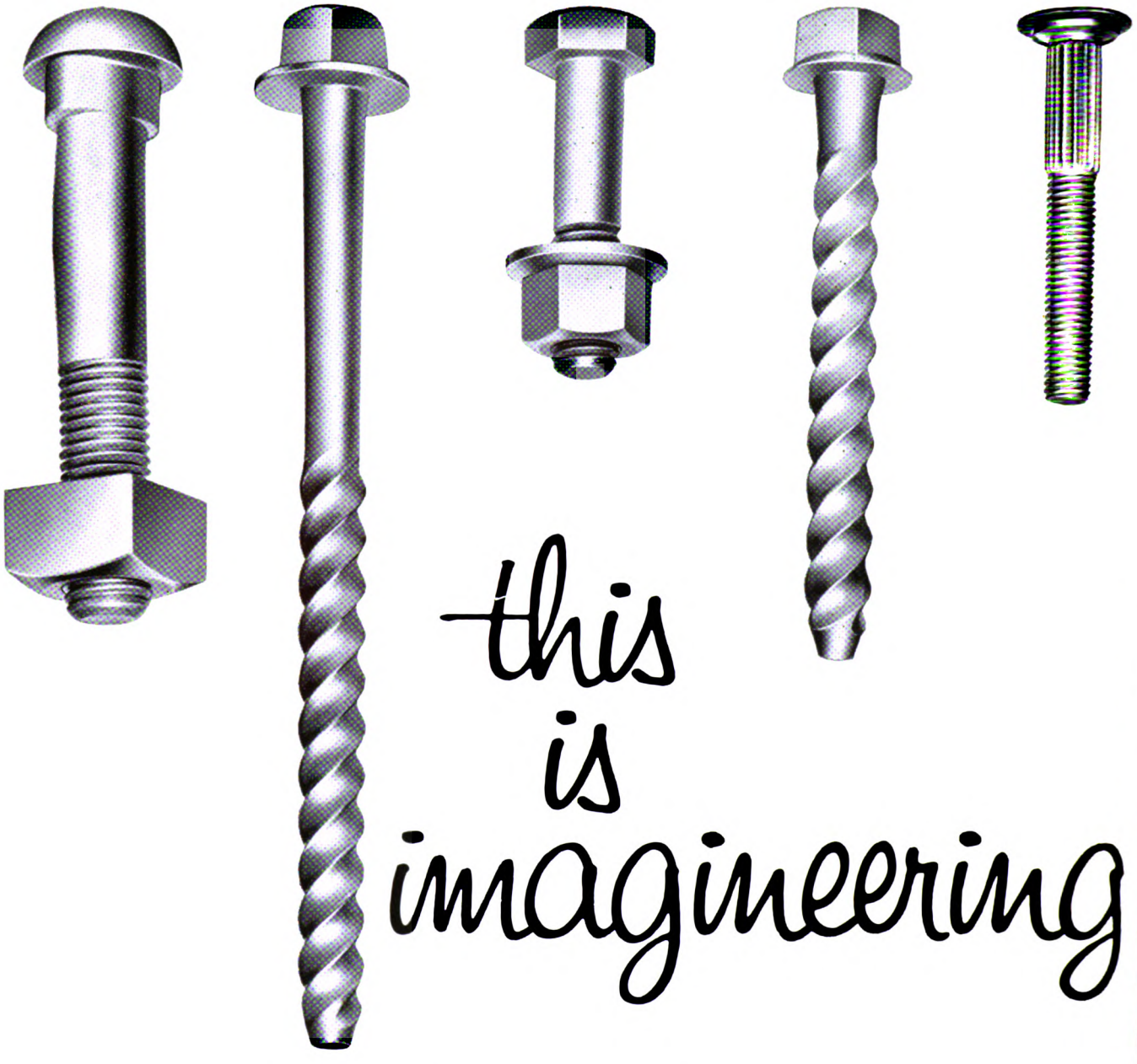
*Revised to September 1, 1962

THE COBRA SHOE... a product of the combined research facilities of—



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EDITORIALS

ngenuity . . . Not Neglect

echanical officers responsible for passenger-car maintenance have shown great ingenuity in recent years. Unubtedly, the passenger-carrying cars of the immediate st-World War II period had too many frills and varia-ns in design to lend themselves to economical maintenance. Rebuilt cars of greater age have often involved mpromises in materials and arrangements which have :ant that their repair costs could become excessive. By ering designs and utilizing new materials, it has been ssible to curb some of the spiralling costs involved in eping both types of equipment serviceable and attrac-e.

The use of heat-resistant glass with over-all or gradu-ed tinting has made it possible for a number of railroads eliminate window shades, always an expensive item. ie removal of streamlined skirting along car sides has eeded and simplified work on underbody equipment nile, at the same time, eliminating repairs which were equently needed on the skirting panels themselves. Re-acement of folding steps with fixed-type steps has also leviated a serious maintenance problem for some pas-nger-car operators. Use of plastic-faced or vinyl-sur-ced materials for interior finishes has done much to keep terior refinishing costs in line. The rapid acceptance of at covers indicates that upholstery cleaning, in the old nse, was ripe for new developments. Even though pas-nger comfort may not be enhanced, elimination of foot-sts certainly speeds car cleaning.

Such responses to management insistence that coach aintenance costs be held down reflects the ingenuity of sponsible car officers and supervisors. Car bodies pre-nted the greatest potential for cost-cutting innovations. nfortunately, demands for economy have sometimes :en reflected in under-maintenance of certain compon-its which should not be neglected and, to date, have not nt themselves to more economical procedures. The two ortions of the car which probably are the most frequent uses of passenger complaints are the trucks and coupler-id-draft-gear assemblies. Noises and impacts developed poorly maintained draft-gear and buffer arrangements ouse adverse reactions out of proportion to the actual scomfort they cause. The same is true of the noises and oor ride resulting from trucks maintained at safe, but not omfortable, levels.

It is essential that wearing surfaces of truck pedestal ners, journal boxes, and swing hangers be properly main-ined. To simplify truck maintenance some railroads ave removed or failed to maintain friction snubbers and ock absorbers on passenger-car trucks. In view of to-ay's track maintenance methods, it is probably more es-ntial than ever that these units be kept in top operating ondition. Even though head-end cars carry no passen-ers, their draft gears have an important role in passenger omfort and should not be neglected.

While the carbody has, and probably still offers, many possibilities for simplification and standardization, it is essential that running gear and draw-gear assemblies be maintained to the standards established when they were originally designed.

September Stimulus

A stimulus is defined as something that rouses the mind or the spirits. The meetings of the Coordinated Associations at Chicago this month do both. They get minds working after summer lethargy and they improve one's spirits by demonstrating that railroading is a live and progressive industry.

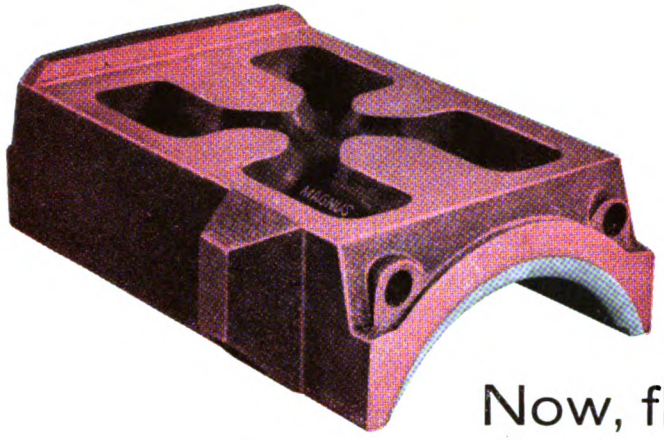
All the sessions will present worthwhile subjects that will rouse the minds because each association selects those topics for its committee reports that are considered to be of greatest current interest. Certain reports, of course, generate more interest and stimulate more discussion than others. One of these is the Lubrication report of the Car Department Officers' Association on Wednesday morning, September 19. Dealing with freight-car bearing performance and the hot-box situation this report has always received special attention from car department men. This year's report will be no exception. With last April being the first million-miles-per-hotbox-setoff month in railroad history, efforts will now be concentrated on how best to reach the two million mark. Everybody will be interested in the attack on this objective.

On the same Wednesday morning the Locomotive Maintenance Officers Association will have two subjects of special interest. The first is the "What is Your Problem" session that is a new feature of the association's program. This session can prove to be a service of great value to the railroads, one that we believe deserves the year-round support of this publication and for that reason we have promoted the session in both our July and August issues. The comments of Mr. Peronto with respect to this session on Page 70 are well worth reading as an objective appraisal of the session.

The other LMOA subject on Wednesday morning is the diesel-hydraulic locomotive presentation by Paul Garin of the Southern Pacific. These locomotives, delivered October 31, 1961, have been in operation about 10 months and we hope that factual data on their performance will be made available. These data are eagerly awaited by not only locomotive maintenance men but by the entire railroad industry.

Some of the best tonics for railroad men's spirits are the addresses made by outstanding railroad men at the sessions. With men like President E. S. Marsh of the Santa Fe; W. D. Dickie, chief of motive power and rolling stock, Canadian Pacific; H. W. Large, vice president, Pennsylvania, and J. F. Nash, operating vice president, New York Central, addressing the sessions we are sure that inspiration will not be in short supply.

The Coordinated meetings are both thought provoking and inspiring. They are worth attending.



Now, flat-back bearings are AAR alternate standard – can be applied without restriction to interchange cars. More and more railroads now apply flat-back bearings regularly – to stabilize journals, make rear seals workable, get still more miles per bearing and per hot box setout

Here's how they can improve your bearing performance – and save money, too!

Magnus flat-back bearings effectively stabilize journals during all normal operation—stay seated on the journal and provide uninterrupted lubrication. By limiting fore-and-aft movement, they make rear seals last longer—keep the oil in and dirt out of the journal box. They *cost nothing* to install.

Even now, solid bearings average almost 1,000,000 miles per hot box—cost less to own and operate than the cost of *merely owning* roller bearings. With Magnus flat-backs, it's expected that miles per hot box will reach 2,000,000 or more—and savings too will multiply.



CURRENT ECONOMICS OF SOLID BEARING OPERATION

New economic study updates solid bearing costs as reported by the AAR in 1954. Shows how lubricators have cut these more than half despite very significant rises in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, or to 80 East Jackson Boulevard, Chicago 4.

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Heavy tonnage operations on the Western Maryland have been aided by slip control system now installed on several road freight units.

Slip-Suppression Brake Is Effective

A wheel-slip control system, developed specifically for low-speed diesel operation jointly by the Western Maryland and Westinghouse Air Brake Company, has demonstrated its effectiveness in improving drag tonnage operations.

Using a light fast-acting brake application and automatic sanding, the slip-control system has produced several operating advantages for heavy tonnage trains moving over WM's mountain grades. In the 10-mph speed range it permits the diesel units to take advantage of available adhesion and maintain steady draw-bar pull. It reduces sand consumption by three-quarters. Less sand on the rails and the more uniform applied tractive force results in lower train resistance and higher train speed. Reduced wheel slippage decreases wheel and rail wear and eliminates conditions that increase train separation possibilities.

Development work on the low-speed wheel-slip control started in April 1961 when the Western Maryland became interested in eliminating undesirable characteristics of its existing slip-control measures. Wheel slips on grades were controlled by heavy sanding and manual or automatic partial or complete removal of power from the traction motors.

Disadvantages of these control measures are:

- Sand can damage electrical transmission and control equipment;
- Sanding results in diesel engines utilizing dust-laden air for combustion purposes, causing accelerated engine wear;
- Sand is detrimental to truck parts such as pedestal liners and center plates;
- Combination of sand and wheel slip produces increased wheel and rail wear;
- Continuous use of sand in grade operation requires that tractive effort, already at or close to rail adhesion limits, be increased to overcome increased train resistance caused by sand on rail;
- Power reduction sufficient to correct wheel slip results in loss of train speed in tonnage grade operation;
- Reduction and reapplication of power to traction motors on slipping unit results in work transfer to other units, making these more likely to slip. It also produces surges in train and increases possibilities of train separation.

Both the Western Maryland and Westinghouse decided that the answer to these objectionable conditions might be found by application of pneumatic wheel slip control. It was believed that a combination of fast-operating air brake slip-suppression equipment and the braking characteristics of composition brake shoes offered the best chance of success. Also, they believed that better wheel-to-rail adhesion would result with composition shoes maintaining wheel contour and clean, smooth treads.

Initial application of the slip suppression system was made to WM GP-9 diesel unit No. 40, already equip-



Multiple-unit operation on WM's heavy grades has demonstrated effectiveness of slip-control equipment in low-speed tonnage operations.

Rapid response to slip indication is insured by design of pneumatic components; application of brake and development of full pressure are achieved in fraction of a second.

ped with Cobra brake shoes. The equipment consisted of two high-capacity magnet valves, one pressure switch, two double check valves and two cut-out cocks. The double check valves separate the normal braking system from the slip-suppression system and permit the engineman to apply the locomotive brakes manually. Because of their location the brake cylinder gauge will not record air pressure in the brake cylinder during a slip-suppression application.

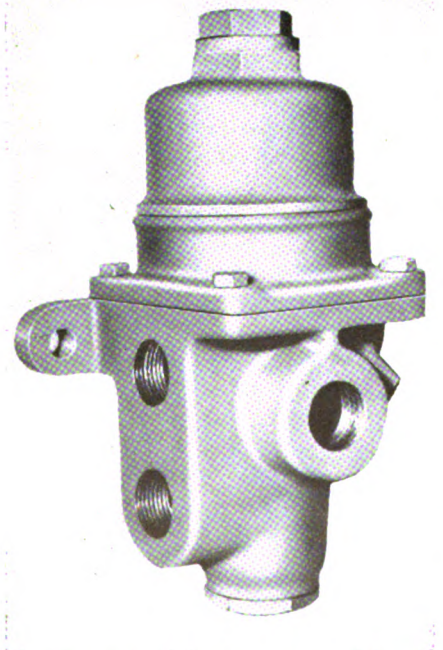
Briefly, the wheel-slip suppression system operates as follows: When a wheel creep is picked up by WCR (Wheel Creep) relay, the magnet valves at each truck are energized. Main reservoir pressure, limited to a predetermined value by the setting of the pressure switch, is supplied to all brake cylinders of the slipping unit, the normal trainline wheel slip light is illuminated, and automatic sanding is provided for five seconds duration. If this braking action and sanding suppress the creep, the WCR relay drops out and no further action is taken.

If the WSS (Wheel Slip Series) relay picks up, the suppression brake is energized, automatic sanding provided, trainline wheel slip indication given and normal battery field contactor drop-out occurs, resulting in partial power reduction. Should the slip be of the type to pick up either the WS-13 (Wheel Slip-Nos. 1 and 3 traction motors) relay or WS-24 (Wheel Slip-Nos. 2 and 4 traction motors) rel the suppression brake is energiz automatic sanding provided, trainli wheel slip indication given, and bo battery-field and shunt-field contacto are dropped out, resulting in a grea unloaded condition. No change made in the pick up values for t wheel slip relays or in the norm wheel slip unloading procedure of t unit as supplied by the builder.

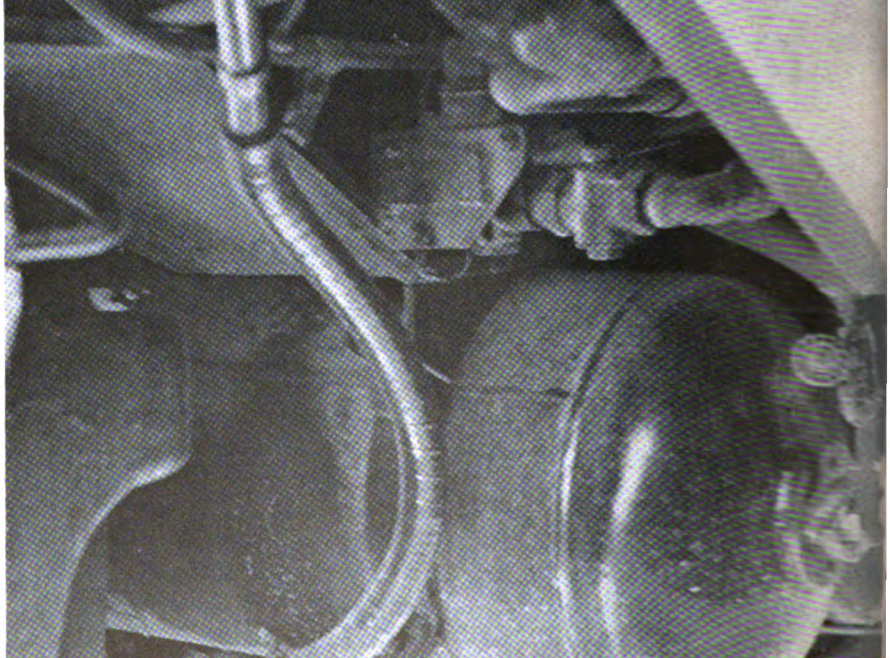
No. 40 was service tested for months before additional units we equipped to permit multiple-unit sli suppression tests. It was instrumente to obtain a film record of speed of ea axle, train speed, the pick-up a drop-out of wheel-slip relays and san ing relay (to measure sand consum tion), drop-out of shunt field and ba tery field contactors, and brake cyli der suppression pressures.

During most tests No. 40 was ope ated as the lead unit because most sli ping occurs at this location. Test da and observations indicated that 16 p was the optimum suppression pressu and the pressure switch was set fo this. It also showed that brake sup pression of wheel slip reduced whee creep and power-reduction time ap proximately 50 per cent.

The improved performance of N 40, along with a large reduction in i sand consumption, resulted in equip ping four additional GP-9s and on F-7 A unit with the slip-suppressio equipment. In addition, the Weste



Magnet valve, activated by locomotive wheel-slip detection system, supplies brake cylinders.



Valve is installed on locomotive underframe adjacent to each truck. **Through a double-check valve** the magnet valve then delivers air to all four brake cylinders on a truck.

Maryland has authorized application of the system to four more F-7 units and one Alco RS-3 unit.

All units were equipped with a cut-out toggle switch inside the high-voltage cabinet. When moved to OFF position, the brake suppression is cut out but automatic sanding is maintained when any wheel-slip relay is energized. Two of the GP-9 units were not equipped with composition shoes to permit comparison in service with two GP-9 units having composition shoes.

A drag tonnage test of the two units with cast-iron brake shoes and new wheels produced severe slipping and unloading of main generators on a 1.6 per cent grade. Chattering of the brake rigging was pronounced and it was believed that sloughing of the cast iron shoes intensified the slipping. The slipping and reduction in power caused an almost complete loss of train speed. Other tests showed that when current did not exceed 850 amp, with a corresponding speed of 12 mph and above, the cast iron brake shoes operated satisfactorily. Because WM's drag tonnage operation frequently requires greater amperage and lower speeds, the two units were equipped with composition shoes.

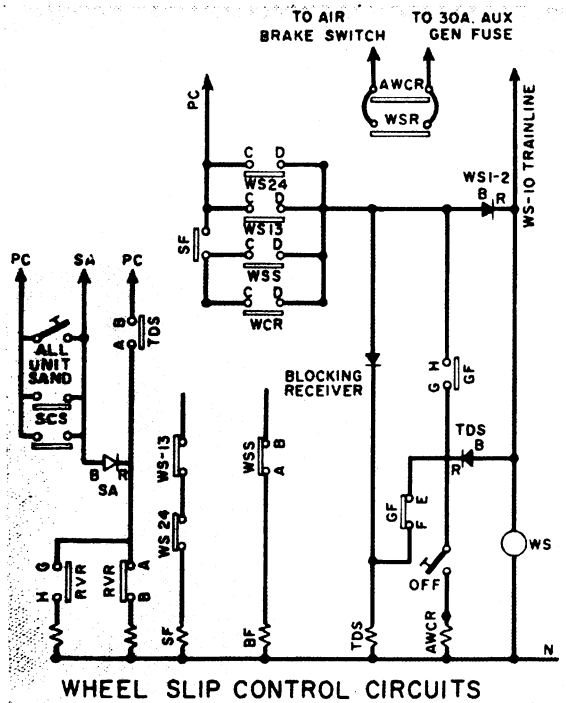
Under actual operating conditions a comparison of the sand used on four units equipped with wheel slip suppression and four units not so equipped was made. Two trains were run for six days each over the same section of the railroad with the same train crews. Total sand used on the four units equipped with wheel-slip suppression was 155 lb; the total sand used on the four units not so equipped was 2,000 lb. All test runs involving units having wheel-slip suppression equipment have consistently shown a 70 to 80 per cent reduction in sand consumption. As an example, six of these units recently used to power a tonnage ore train from Baltimore west used a total of 585 lb of sand to control wheel slip on a bad rail. Normal operation under these conditions is continuous use of sand under all units on grades. It is estimated normal operation would have consumed approximately 2,340 lb sand (65 min on grades x 6 units x 4 sand traps x 1.5 lb per min sand delivery).

Undoubtedly some of the marked decrease in use of sand results from non-use of sand except when the slip detection system indicates sand is required. That is, the wheel-slip suppression system makes it possible to wait until wheel slip is indicated before sanding the rail. By doing this automatically, the human element is taken out of the decision to lay sand. When sand is manually controlled, the engineman has little choice in tonnage grade operation but to continuously sand all units since he can not predict the exact point of slippage or the units slipping.

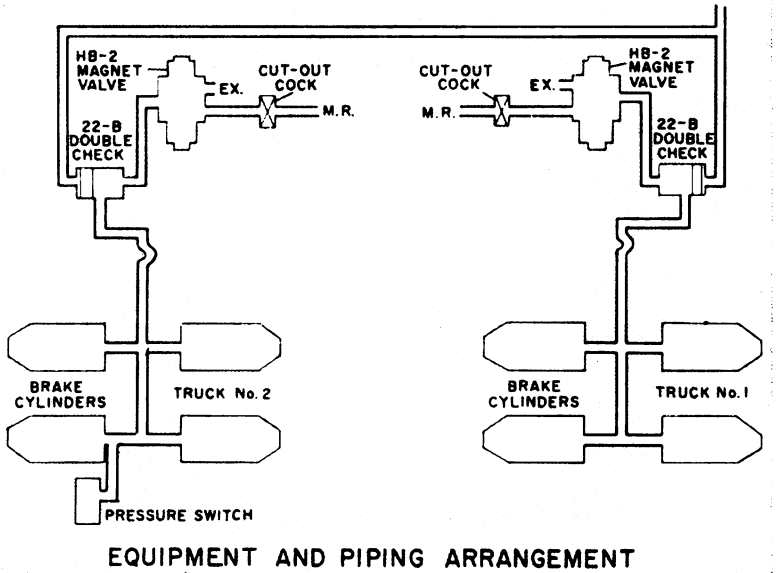
Continuous use of sand under all units results in decreased train speed and increased draw bar pull because of increased train resistance due to sand on rails. On several test runs, wheel-slip suppression was cut out on grades and manual sanding was used to observe the effect of heavy use of sand on train speed. Train speeds consistently decreased from one to one and a half miles per hour in a distance of slightly more than one train length.

One interesting aspect of this joint investigation of wheel-slip control has been, and is, the fine cooperation between WM and Westinghouse personnel. Test reports were signed by the men from both companies who supervised the development work and tests. Responsible officers of the railroad and the air brake company received the same reports so no misunderstanding would exist in evaluation of test data and observations. In addition, bulletins to WM enginemen explained the wheel-slip control system, told them about anticipated advantages, and asked for their cooperation and comments.

The system is of known value in suppressing wheel slips in high-speed operation. On the Western Maryland the development work was aimed specifically at controlling low-speed wheel slips. To date it has demonstrated its effectiveness in doing the job for which it was designed—improving drag tonnage train operation in the 10-mph range.



WHEEL SLIP CONTROL CIRCUITS



EQUIPMENT AND PIPING ARRANGEMENT

Installation of brake-control components and changes in locomotive wiring were not complicated. Schematic wiring for GP-9 wheel-slip control shows added controls; truck brake system was altered by installation of HB-2 magnet valves and 22-B check valves.



Detectors at entrances to N&W yards have altered inspection methods.



Detectors monitor all journal boxes; tapes for passenger trains are ch

Hot-Box Detectors Have Major Role i

Hot-box detectors have become a standard method for making inspections of freight-car journals on the Norfolk & Western. They have eliminated the opening and inspection of journal boxes in many N&W yards. By so doing, the mechanical department's most time-consuming operation involved in the routine yarding of trains has been eliminated.

This has not impaired the road's journal performance record. In 14 of the 24 months in 1960 and 1961, the N&W topped all other roads in the AAR Mechanical Division's miles-per-hot-box-set-off statistics.

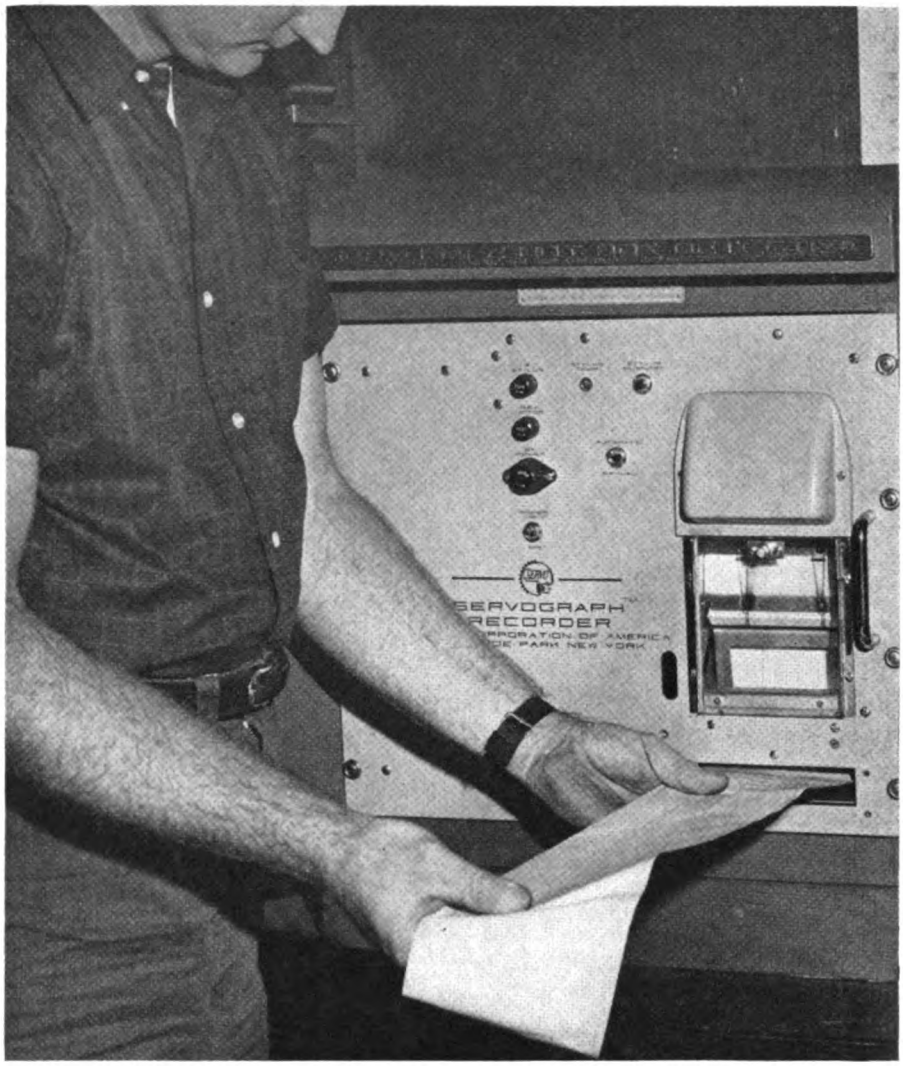
Along with setting frequent national records in journal-box performance, the N&W has simultaneously made a substantial reduction in mechanical department forces assigned to train inspection and servicing in transportation yards. "The 100% application of lubricating pads, installation of hot-box detectors at the entrances to our yards, improved yard oil-distribution systems, and roll-by inspections at certain of our terminals have proved to be a great asset in expediting cars through terminals," C. E. Pond, general superintendent motive power, reports. "Hot-box detectors are an advantage to car inspectors in pinpointing journal boxes running above normal on cars entering yards. This is especially true in cases where an immediate inspection cannot be made when a train stops and boxes have an opportunity to cool off."

It is impossible, according to Mr. Pond, to ascribe specific percentages of the improved journal performance and expedited yard operation individually to lubricators, to hot-box detectors, and to new servicing and inspection procedures. Undoubtedly, lubricating devices have been the largest single factor in the overall picture; the hot-box detectors occupy a prominent position. Both came into use at about the same time, and it is difficult for the N&W to determine their individual effects.

Great reliance is placed on the hot-box detector, and figures to demonstrate their effectiveness are regularly accumulated by the road's engineer of tests. A recent study of results from several of these devices indicated that of all the cars shopped because the yard-approach detectors indicated some abnormality, 96% were actually found to have defective bearings



...l with those produced for passing freight trains.



Car department employee checks tape from yard approach detector as it is produced.

...&W Car Inspection

or other journal-box components. In just over 4% of the cases reported by these detectors could nothing be found.

The N&W has been one of the real pioneers in the use of hot-box detectors. Its first installation was made west of Roanoke yard in 1957 (RL&C, August 1957 issue, page 40). From the beginning, the N&W mechanical officers have appreciated the potential in these devices. A series of yard-approach detector installations was made during the next three years. Today, there are seven in service. About six months after the first yard installation was made in 1957, the first so-called "line-of-road" detector went into service near Petersburg, Va. Today, there are 12 of these. Several more yard and road detectors are authorized for installation in the next few months. The road's management is firmly convinced of the justification for these devices.

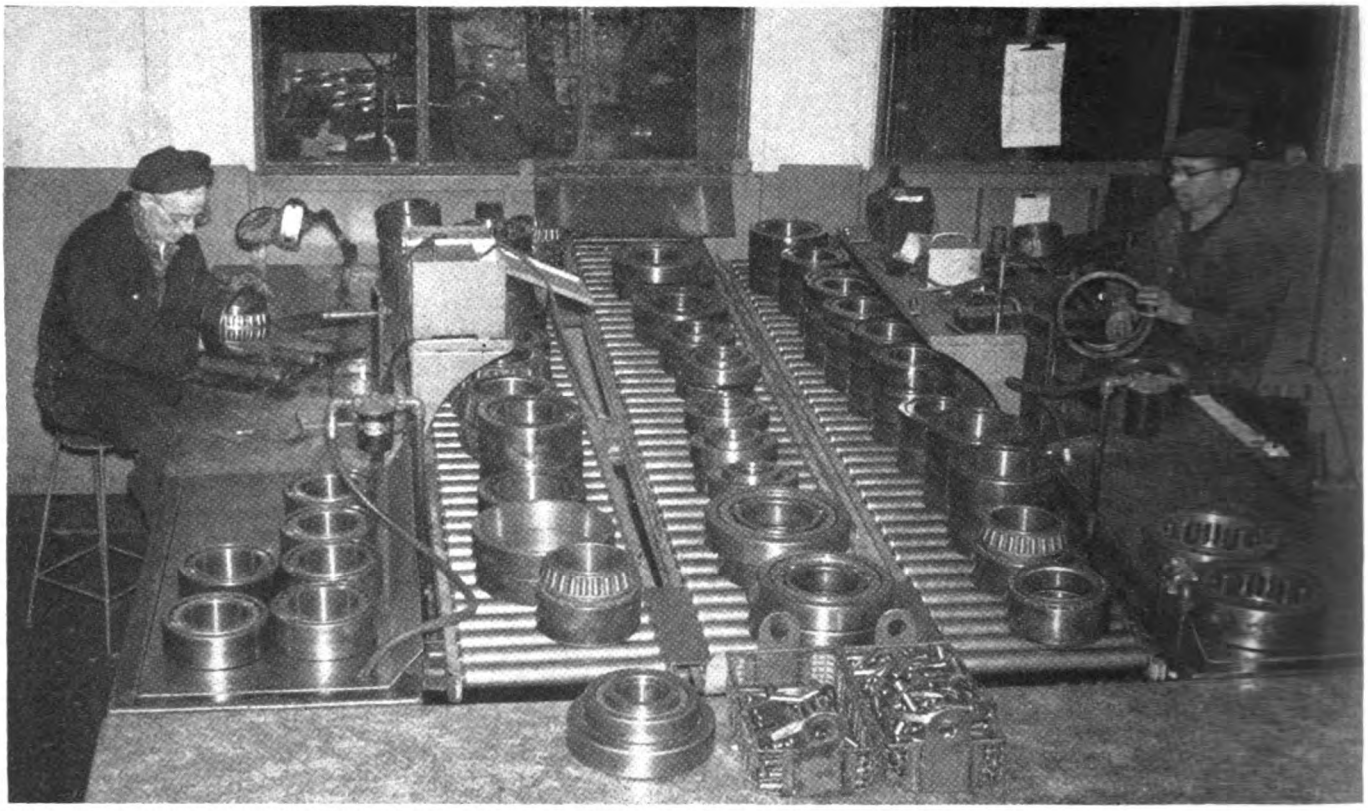
Although with hot-box detectors there is no traditional journal-box inspection or servicing in many N&W yards, this does not mean that the cars receive no attention while going over the line. It is standard procedure to service all eastbound coal loads at Bluefield or Elmore, W. Va., and all westbound coal loads at Williamson, W. Va. At these points all boxes are visually inspected, have oil added, and are prepared for what is normally a trip of at least 800 miles involving the loaded run to destination, the empty trip back to the mines for loading, and the return under load to Bluefield, Elmore, or Williamson. The low oil consumption which is inherent with journal lubricators, and their stability in journal boxes, in conjunction with the fact that the journal-assembly operation is monitored by hot-box detectors at frequent intervals en route, has been found to be completely effective.

Cars other than empty and loaded open-tops normally receive a complete inspection and servicing at the first yard into which they go after being received in interchange, or after being loaded. Such cars then normally move in what the N&W terms "time freight" service.

For all trains passing hot-box detectors as they approach yards, it is standard procedure to have a mechanical department employee examine the tape from the device as it is being produced. Only those boxes indicating excessive temperature are inspected and serviced when the train is actually yarded.

The 96% efficiency of these yard-approach detectors has meant that foremen and inspectors have come to

(Continued on page 54)



Bearings are inspected, assembled and sprayed with rust preventive before being wrapped and placed in storage racks.

One Shop Handles CN Roller Bearings

Consolidation of shop facilities has increased the efficiency with which roller bearings are processed

A centralized cleaning and inspection facility for all types of traction-motor, main-generator, and axle roller bearings on Canadian National locomotives and cars is already producing significant cost reductions by making possible more systematic, uniform, and improved procedures. It has concentrated, in a single area at the CN's Point St. Charles shop in Montreal, the work which was formerly done in three different sections. Point St. Charles is the largest of three heavy motive power and car repair shops on the 24,000-mile system.

Unit cost for cleaning and inspection has been reduced by more than 75%, comparing 1958 costs for the former methods with 1961 costs following completion of the new facility. By adopting "more practical" inspection standards, over $50,000 was saved during 1961 on the replacement of traction-motor and main generator bearings alone. These are typical of the results from a two-fold assignment given three years ago to the work study group which is a permanent part of the staff at Point St. Charles shop, under C. R. Buskard, works manager.

Prior to the rearrangement of the bearing maintenance facilities, cleaning and inspection of roller bearings were done in the three sections of the shop where the car and locomotive components which involve the different bearings were repaired. These areas and the bearings were:

- Winding shop, which handled the armature bearings from traction motors and main generators;
- Diesel wheel department, which processed the axle journal bearings from locomotive wheel sets;
- Car wheel shop, which cleaned and inspected the axle journal bearings from freight and passenger car wheel sets.

A study of these three separate operations showed that they were each doing the same general types of work. As the work study group reported: "When bearings are cleaned and inspected in three separate areas by eight different mechanics and supervised by three different supervisors, it is difficult to control inspection procedures . . . Bearings are not as clean as they should be when applied, due to inadequate protection and storage facilities."

Centralization of these operations was not a simple problem. All types of axle roller bearings—Hyatt, Timken, and SKF—were involved. In the case of bearings for electrical rotating equipment, even more would have to be processed. Primary disadvantages of the proposal were that materials handling problems would be increased, possibly requiring a larger bearing stock, and that there would be an increase in materials transportation costs.

Against these were the following advantages:

- Better quality control both in cleaning and inspection would result

first wet grinder to sell for less than $300.00

and it's by... SIOUX!



Sioux No. 624
Valve Face Grinding Machine

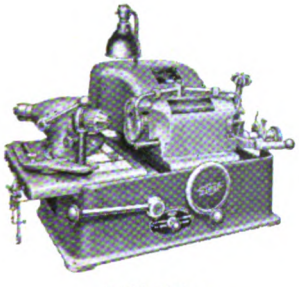
1ST CHOICE

MORE SIOUX VALVE EQUIPMENT IN USE THAN ALL OTHERS COMBINED!

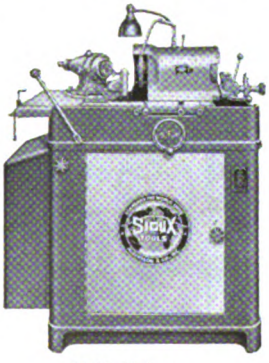
Now your shop can enjoy all the advantages of a SIOUX wet valve face grinding machine for just $298.50. The SIOUX 624 has sufficient stem capacity —3/16″ - 13/32″—to handle all small and medium size valves.

Though low-priced, the 624 in no way sacrifices SIOUX quality. Tolerances are close, craftsmanship excellent. Features include a new self-aligning cone-type clutch which operates with feather-light touch; the famous SIOUX roller-type chuck, redesigned for smaller valve stems; self-contained coolant system; grinding head with proven SIOUX bearing design; powered by ⅓ h.p. motor, and glare-proof, thermo-plastic vinyl finish.

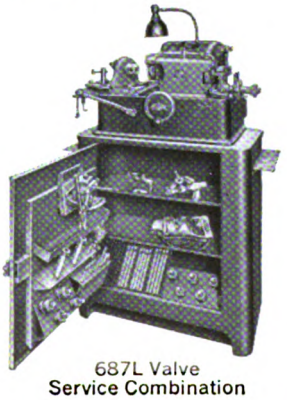
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645L Valve
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SIOUX Catalog includes 19 pages on valve equipment.

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from standarized procedures under direction of a single supervisor;

- Reduction in the number of bearings scrapped could be expected as the result of uniform inspection procedures;
- Contamination of bearings would be eliminated by processing them in a pressurized, dust-free room and subsequently wrapping them in rust preventive paper for storage;
- Labor costs could be reduced with the new cleaning procedures;
- Conveyors could be utilized to reduce handling time—an installation which could not be justified in three separate areas;
- Production records could be kept more easily and more accurately.

A complete financial analysis of the bearing-shop project was also completed.

Project Authorized

It was concluded that the investment needed to install the pressurized inspection and storage room, the conveyors, the mechanized cleaning equipment, and the additional tools could produce an appreciable return, and the project was authorized in 1961. Along with determining the equipment and facilities needed, standard procedures were established for the disassembly, cleaning, and inspection of each type of roller bearing. Since the new lines have gone into operation, time studies have made possible the establishment of standard allowances for each operation.

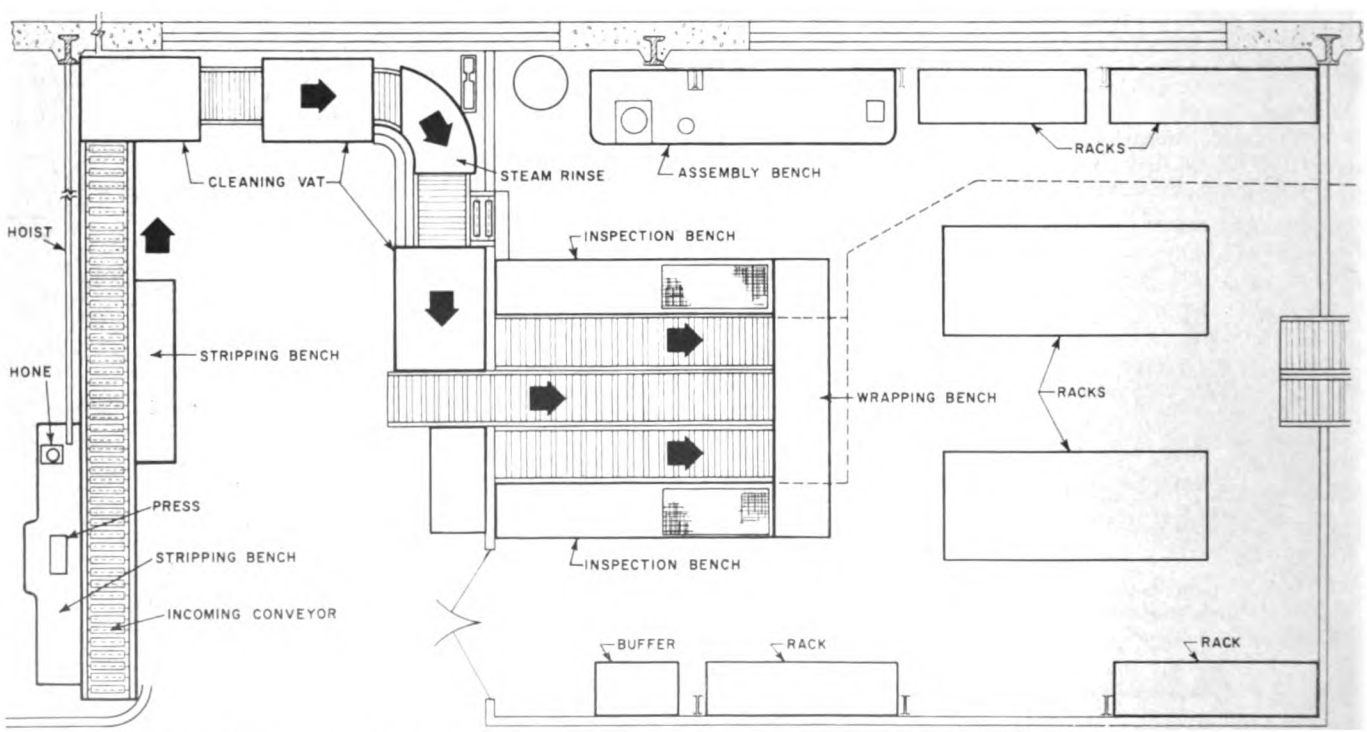
Before the cleaning facilities could be laid out, a major problem confronted the shop management. This was the problem of removing the lubricant from large numbers of grease-type car journal bearings, and bearings from motors and generators. When this work was done in the car wheel shop, it involved much hand labor and even then had never proved to be completely successful. Grease was never completely removed so that parts would be immediately ready for close inspection.

A number of different cleaning systems were tried. These included a series of different metallic solvents in agitating-type vats, the vapor degreaser, steam and solvent delivered through an injector, and ultrasonic cleaning. In each case it was found that even when bearing exteriors appeared clean, there would still be grease on the rollers within the cages and on the cages themselves. Finally, it was found that heated car oil would satisfactorily dissolve this heavy-duty grease. This oil is the standard lubricant used in solid-bearing journal boxes. Heated to a temperature of 260 to 270 deg F, this oil will thoroughly clean all grease encrustation from axle roller bearings in a 15-min cleaning cycle, and from motor and generator bearings in 45 min. Once this problem had been resolved, the shop procedures could be established and the layout could proceed.

Pressurized Room

Centered around a 24-ft by 28-ft pressurized inspection and storage room, the bearing maintenance facilities in the main shop include a series of cleaning units, conveyors for moving the bearings through the cleaning cycles and into the bearing room, and two benches where bearings are disassembled after delivery from the three separate sources in the shop. While all bearings are cleaned in metallic solvent and Varsol, only the grease-lubricated types are also processed initially in heated car oil. All these cleaning materials are used in air-lift tanks. Along the inlet conveyor to the heated-oil air-lift tank are two benches, one equipped with an arbor press and hand-honing machine and the other serving as a work station where disassembly of bearings can be completed and their components placed in parts containers prior to going through the cleaning cycles.

Transport procedures have been specified for moving the bearings from the three shop sections, where they are removed, to the bearing room. Special boxes and compartmented



Flow of various types of bearings has been carefully developed. Procedures vary with the different models. Pressurized room is an important factor in assuring the proper operation of the bearings after they have been assembled and returned to service.

letter to the editors

Recently, the following editorial appeared in RAILWAY LOCOMOTIVES AND CARS (July '62 issue):

"Now, AAR hotbox statistics for April...are expected to show more than a million freight-car miles per hotbox set-off between terminals as the average of all reporting railroads, an outstanding achievement."

"The rapid rise in miles per hotbox has created new problems. One is the need to insure the journal boxes being oiled at mileage intervals that will prevent them from running dry. Another is one of hotbox detection. Telltale smoke signalled watchful eyes and keen noses that hotbox conditions existed in waste-packed boxes; pads under overheated journals in tightly sealed journal boxes do not emit a similar smoke alarm. This is the principal reason that the number of burned-off journals and derailments have not declined in the same ratio as hotboxes."

(underlining is ours)

The switch to pads is rightly given credit for a great deal of this improvement. Yet, as another editor (RAILWAY AGE, June 25, 1962, issue) puts it,

"All credit for the improving hotbox record can not be given to lubricating devices replacing loose waste. Roller bearings, hotbox detectors and other improvements have also affected the record."

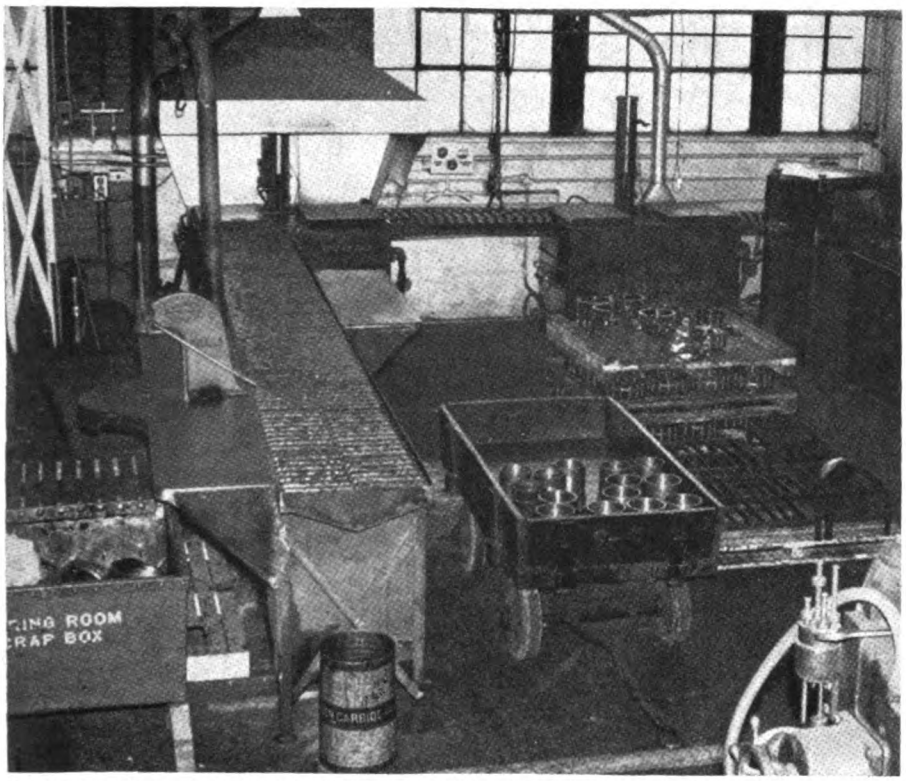
The complex problem of hotboxes is ultimately one of lubrication. But, lacking a panacea in this area, a series of preventive steps, having an additive value to one another, can probably boost the average between set-offs to two million miles in the not-too-distant future.

We believe—as do the twenty-eight major Class I American railroads that have already installed them—that SERVOSAFE® Hot Box Detective* Systems are an important part of the answer. Hotboxes that are *just beginning* to overheat are easily identified by their pips on the SERVOGRAPH® chart. And this is true for cars on the main line, at key points such as bridges and tunnels, or on their way into the classification yard. Corrective lubrication, or car set-out, can be accomplished before a critical condition arises. When installed at recommended intervals, the SERVOSAFE Hot Box Detective System can virtually eliminate journal burn-offs and derailments. It complements the other preventive measures taken, with an added dimension of certainty not possible by visual and manual means alone.



Railroad Products Division
SERVO CORPORATION OF AMERICA
111 New South Road, Hicksville, L.I., N.Y. • WEIls 8-9700

* Protected under one or more of the following U.S. Patent Nos.: 2,880,309, 2,947,857 and 2,963,575. Other U.S. and foreign patents pending.



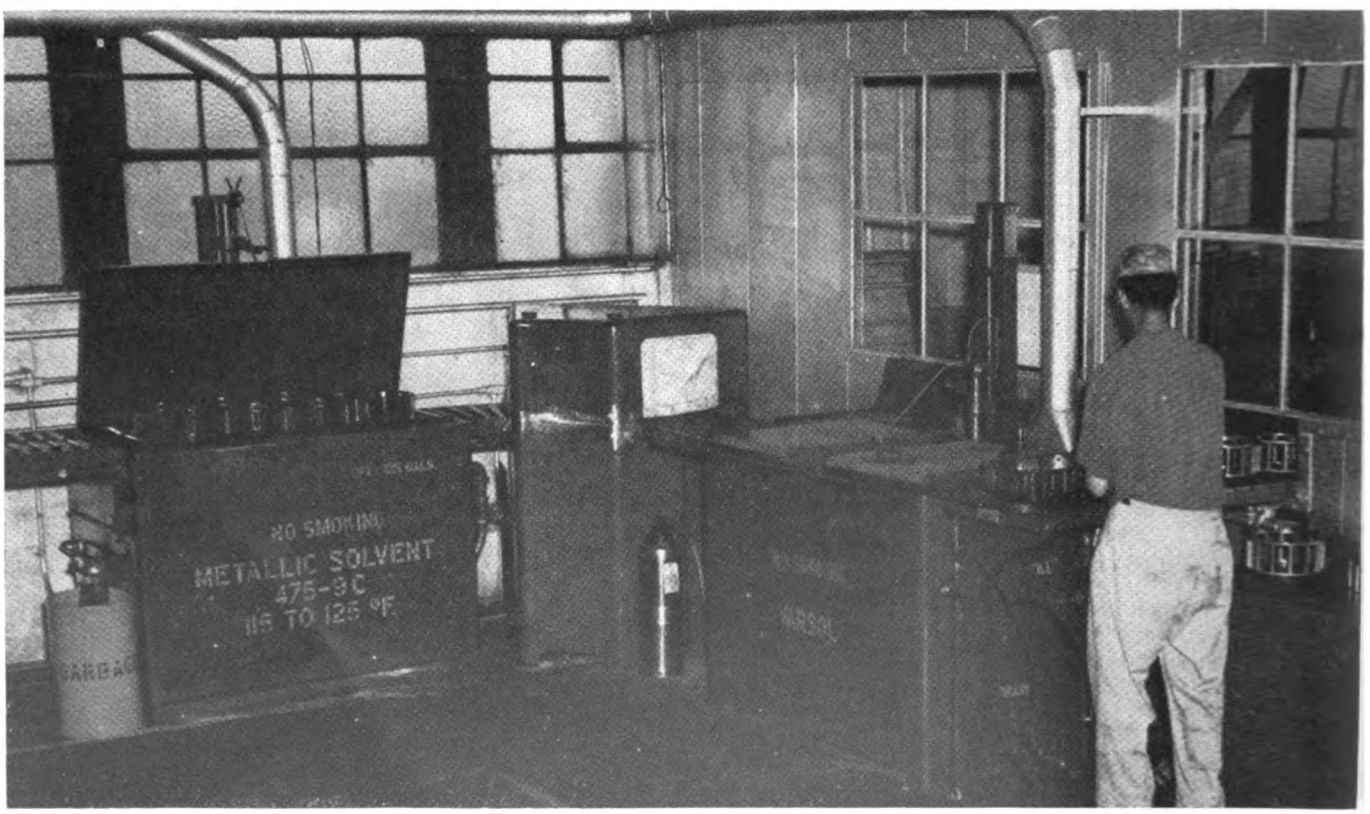
Bearings which must be disassembled before cleaning are handled on bench at left; those which must be processed in heated car oil go down the conveyor to agitating vat at rear.

baskets are used for some types. Hyatt bearings are moved as assemblies to avoid damage to rollers which are held in place with a metal hose clamp.

The arbor press is used for disassembly of the cartridge-type car bearings. The bores of car and locomotive axle bearings found scored during a preliminary examination are honed with a small motor-driven honing machine to remove such scoring. If honing is not necessary, the bearings and parts containers are moved on for cleaning. While the cleaning cycles in hot oil are of different lengths, all cleaning in the metallic-solvent tank is done in 20-min cycles with the solvent at 115 to 125 deg F.

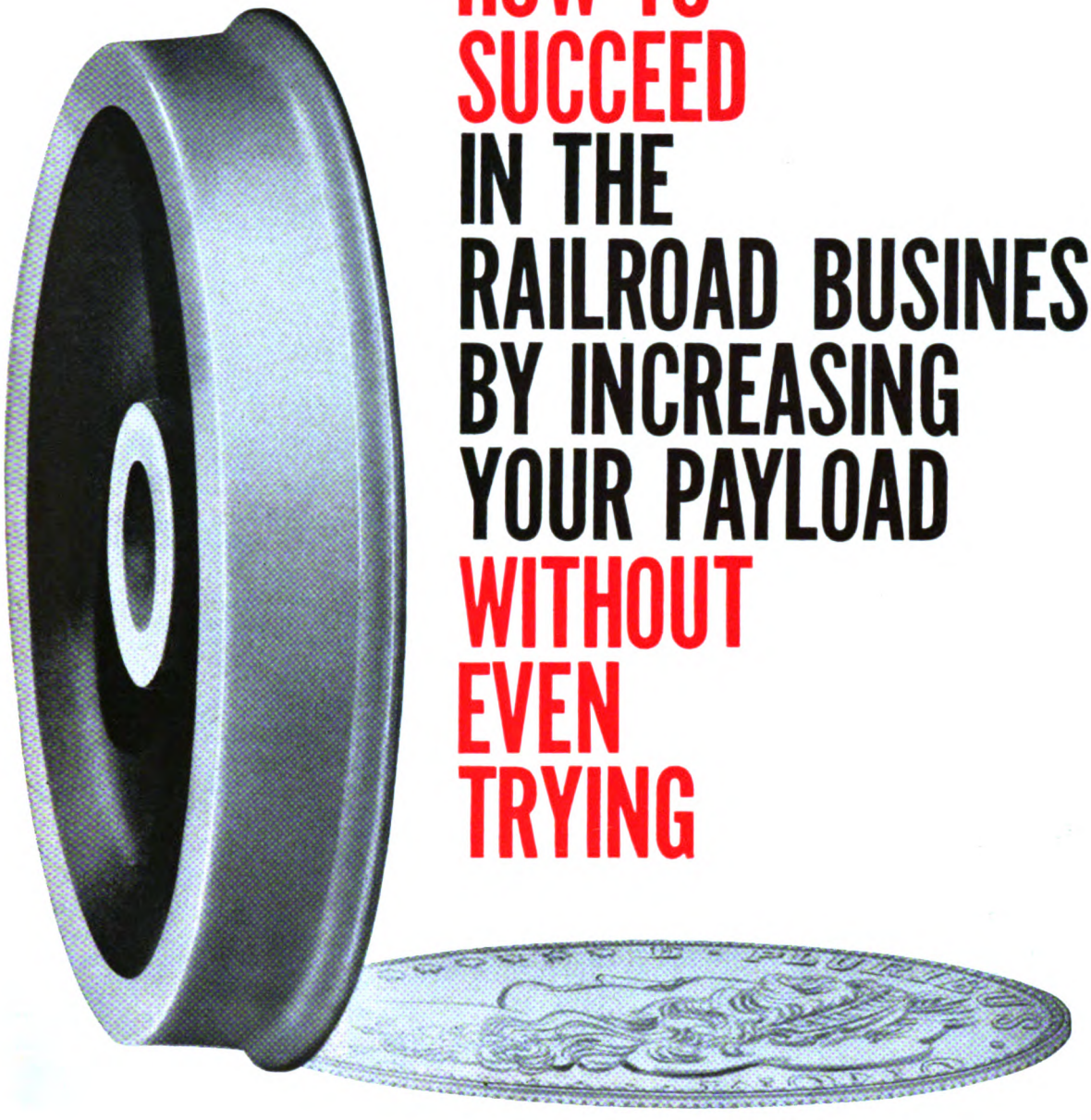
After bearings have been through both these heavy-duty cleaning cycles, they go into a hot-water rinsing cabinet where traces of metallic solvent are removed so as not to contaminate the Varsol rinse which follows. All parts are placed in the Varsol air-lift for ½ min to remove any remaining dirt and to prevent rust during subsequent inspection. The temperature of the bearing at this time is high enough to evaporate most of the Varsol. The remainder is blown off before the bearings go on for inspection and assembly.

Conveyors pass through the walls into the bearing room, delivering parts directly to two inspection benches in the pressurized room. Bearing parts are inspected visually. A buffer with its own exhaust system is used for polishing components of traction motor and main generator bearings if this is found necessary. Parts having any defects are placed on a storage rack where they are examined by the bear-



All bearings are cleaned in the metallic solvent and then are rinsed with steam in the cabinet in corner. Next, they go through the Varsol vat where they receive a coating to protect them from rust while they are being inspected and reassembled.

HOW TO SUCCEED IN THE RAILROAD BUSINESS BY INCREASING YOUR PAYLOAD WITHOUT EVEN TRYING



ıcceed without trying? As easy as this . . .

carset of Edgewater *wrought* steel wheels for a 50-n freight car weighs 560 pounds *less* than wheels anufactured by a different method.

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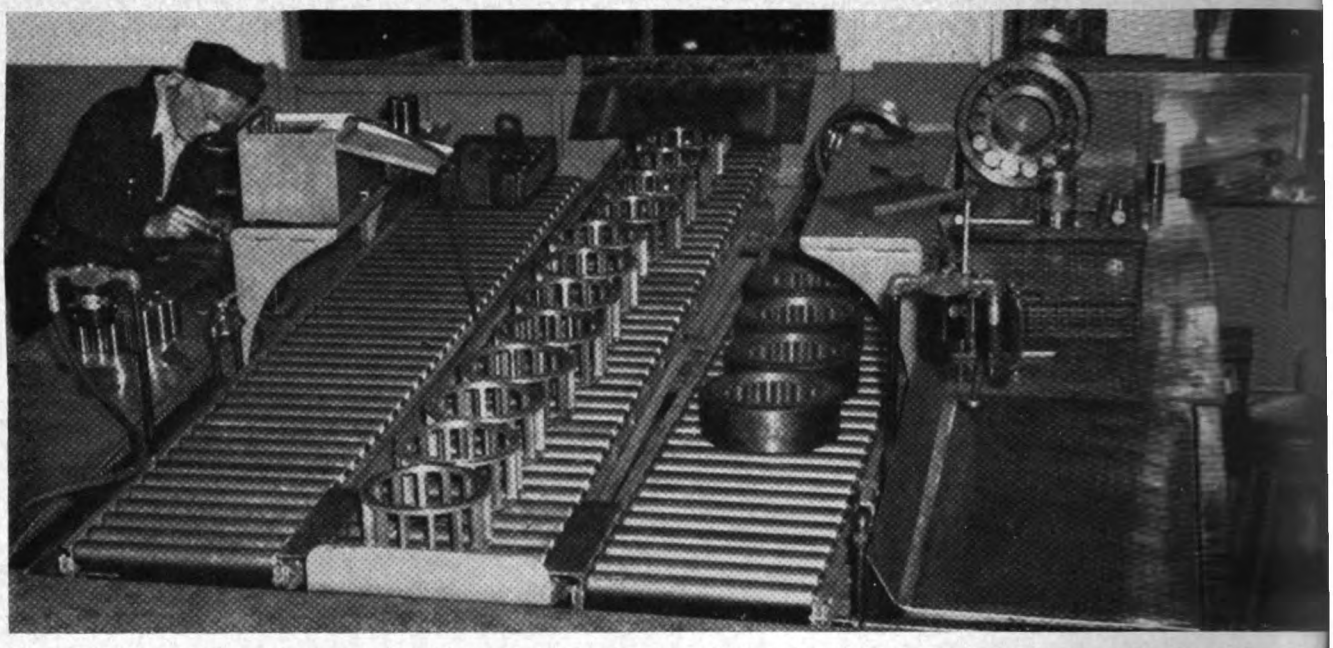
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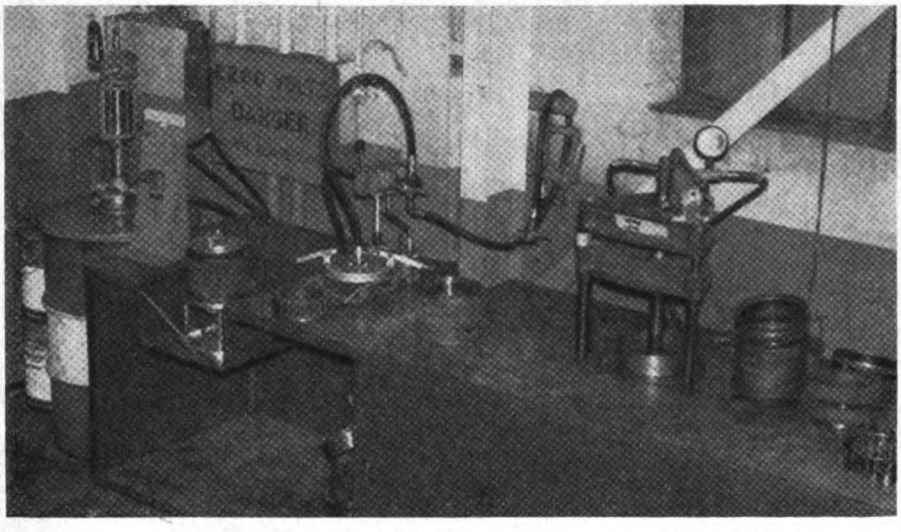
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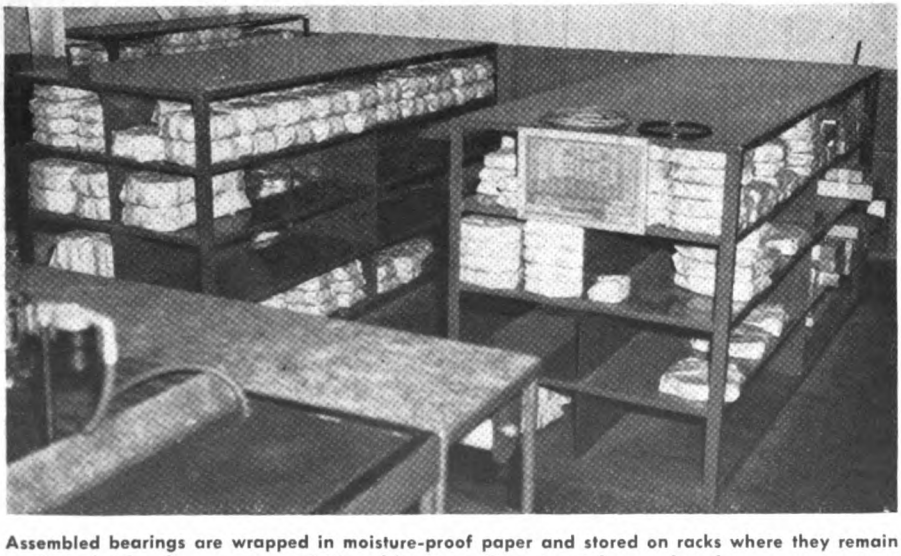
P. O. Box 478 • Pittsburgh 30, Pa.



Inspection and assembly benches are equipped with magnifying glasses and stands to hold outer races while bearings are again being assembled. Following assembly, the bearings go on to the oiling rack (in foreground) where they are sprayed with a rust preventive.



Special press and greasing tool are needed for assembling the package-type freight-car bearings. Canadian National has separate bench for these operations.



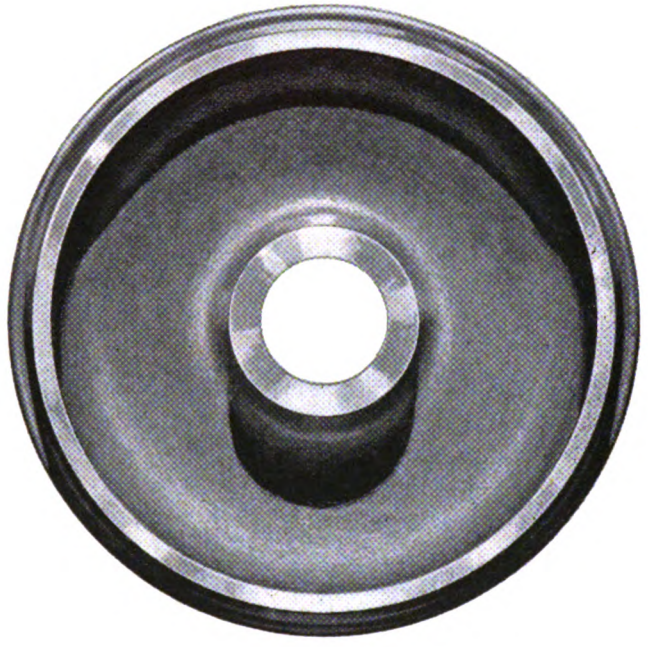
Assembled bearings are wrapped in moisture-proof paper and stored on racks where they remain until needed by shop or are requisitioned by Stores Department for another shop.

ing-room supervisor who decid whether they will be scrapped or r turned to the manufacturer for re lamation. All bearings, except t cartridge type for car journals, a assembled on the inspection bench They are then placed on a drain p where they can be sprayed with a ru preventive, or can be greased with t standard roller-bearing lubrica which is applied to heavy-duty freig car journal bearings. After assembl all bearings are individually wrapp in rust-preventive paper. Each su package is marked with the seri number and type of bearing it co tains. These bearings are then tran ferred to a series of storage rac where they are held until required the shop or at some line point.

While the locomotive-axle, tra tion-motor, and main-generator bea ings can be assembled manually on th inspection benches, the cartridge-typ freight-car bearings require specia greasing and assembly equipmen These devices are installed on a specia bench along one wall of the bearin room. After the components of the bearings have been inspected visuall they are transferred to this bench Initially, they are checked for later to determine if there has been exce sive wear in the spacers. The partiall assembled unit is then placed on th greasing fixture where it is lubricate and then moved to the assembly pre where the seals are installed. The bearings are also wrapped in rust-pre ventive paper for storage until needed

More than 2¼-million Griffin EQS Steel Wheels roll steadily and smoothly under all types of equipment. They provide:

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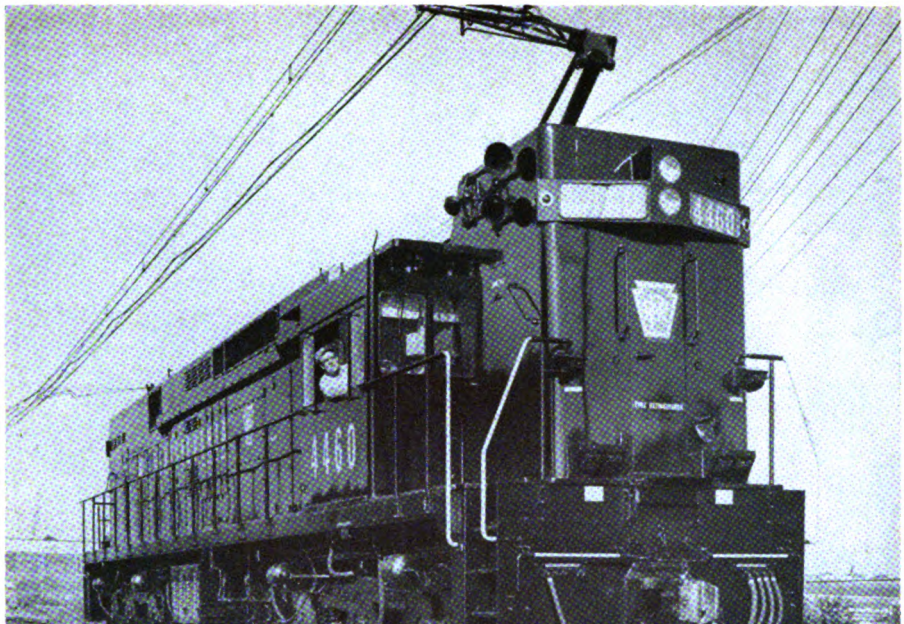


Griffin® Wheels Are Cast in Balance to Stay in Balance. A pair of wheels on an axle may have the same tape size and *still* be out of balance . . . slowly and steadily shaking running gear out of alignment. This doesn't happen with Griffin Wheels because dimensions, as cast, are accurate to 20-thousandths of an inch.

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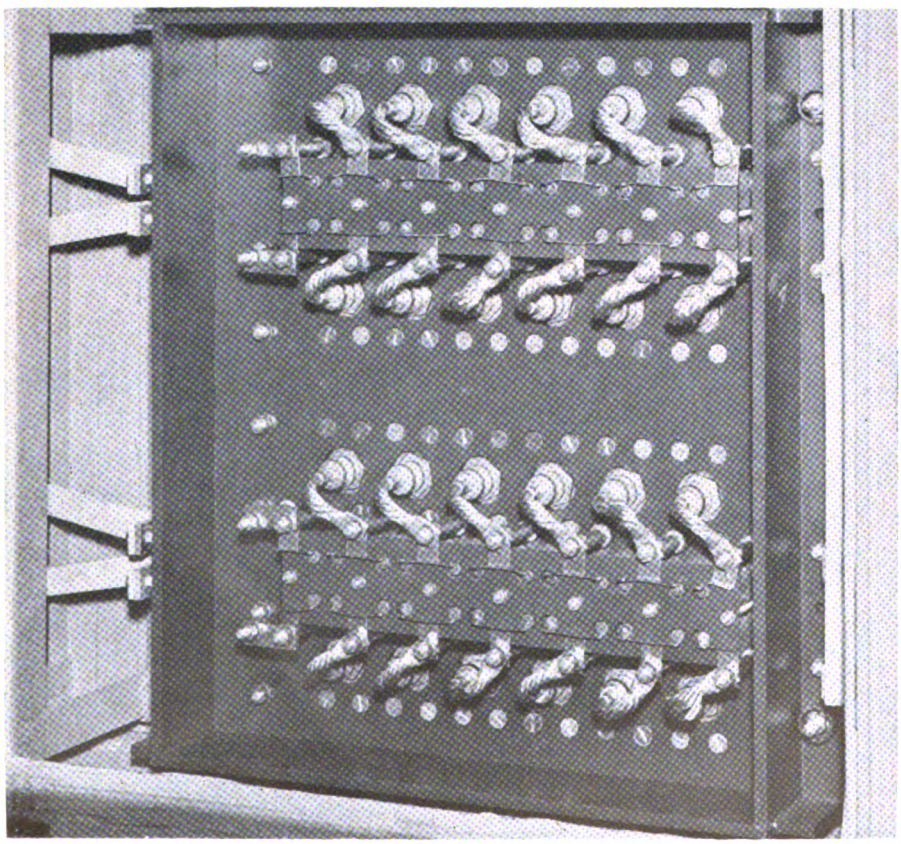
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Six silicon-rectifier locomotives may be in service on the Pennsylvania by late next year.

Pennsy Gets First U.S. Silicon-Rectifier Unit



Front of panel shows the 24 rectifier cells and their pigtails. Finned aluminum heat sinks are at back of panel. Locomotive has 16 of these panels for traction power rectification.

First silicon rectifier locomotive to go into service in the U.S. has completed two months of operation on the Pennsylvania. The unit, one of the order for 66 electrics which General Electric started to deliver almost two years ago (RL&C, Dec. 1960, p 50), has banks of solid-state rectifiers in place of the mercury-arc (ignitron) rectifiers with which the 41 previously completed locomotives are equipped.

If tests with this 4,400-hp locomotive prove successful, the PRR expects to have the last five units of the order built with silicon rectifiers. Since October 1960, these locomotives have been delivered at a two-per-month rate, with the last unit scheduled for delivery in mid-1963.

Although it is the nation's first silicon-rectifier locomotive, the new PRR unit follows successful application of silicon rectifying equipment to multiple-unit electric commuter cars on the PRR and the New Haven (RL&C, May 1961, p 28). The 38 multiple units recently ordered from Budd for PRR suburban service in the Philadelphia area (RL&C, June 1962, p 8) will have silicon rectifiers. The French National Railways placed 15 4,000-hp silicon rectifier locomotives in operation during 1961.

Both the PRR and the New Haven have 11,000-volt, 25-cycle alternating current distribution systems. The French locomotives take their power from 25,000-volt, 50-cycle catenary. Rectifiers either of the mercury-arc or silicon type change the high-voltage a-c to d-c for d-c traction motors.

Increased Efficiency

Increased efficiency is the basic reason for rectifiers. They permit use of the better transmission characteristics of alternating current while taking advantage of the more efficient d-c traction motor. Advantages of the air-cooled silicon rectifiers compared with the ignitron rectifiers include a reduction in space required on the locomotive for power conversion equipment along with the elimination of the water-cooling and firing circuits required for the mercury-arc tubes. GE engineers expect silicon rectifiers to produce savings in first cost and maintenance.

The new PRR locomotive has a total of 384 silicon-rectifier cells, supplied by GE's Rectifier Components

(Continued on page 50)

New

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202

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A new, "use it everywhere" liquid detergent —Oakite 202—now offers the greatest convenience EVER in cleaning. It goes into water solution quickly without waste... without fire hazard. You spray, mop or brush it on.

Oakite 202 forms a rich, sudsy solution that's packed with cleaning power. It knifes through road grime, grease, scuff marks—even dried-on bug deposits. Use it wherever you have a tough cleaning problem. It does a wonderful job washing diesel interiors and exteriors. And it certainly does a job on passenger car interiors. It lightens oily shop floors, brightens greasy equipment. It's safe for any surface, including aluminum. It dries down without streaking.

But here's the BIG pay-off—Oakite 202, in mild solutions, *out-performs* stronger solutions of other cleaners. This makes 202 a most economical *all-purpose* material.

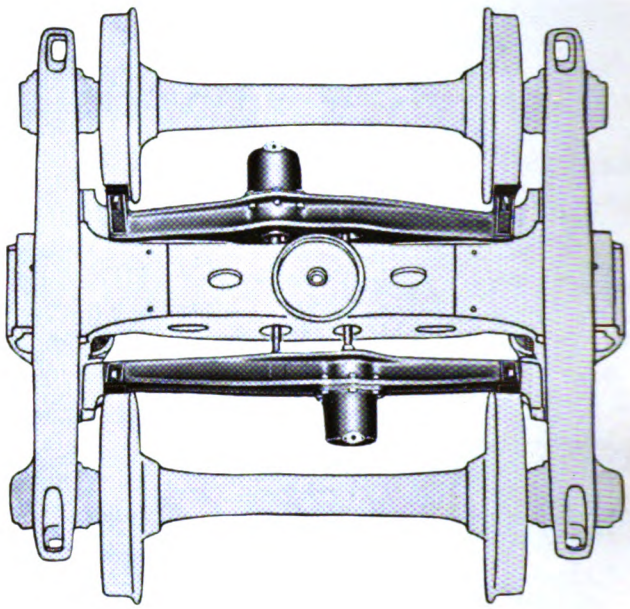
Ask your local Oakite man for a convincing see-for-yourself demonstration without obligation. Or send for free bulletin to Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

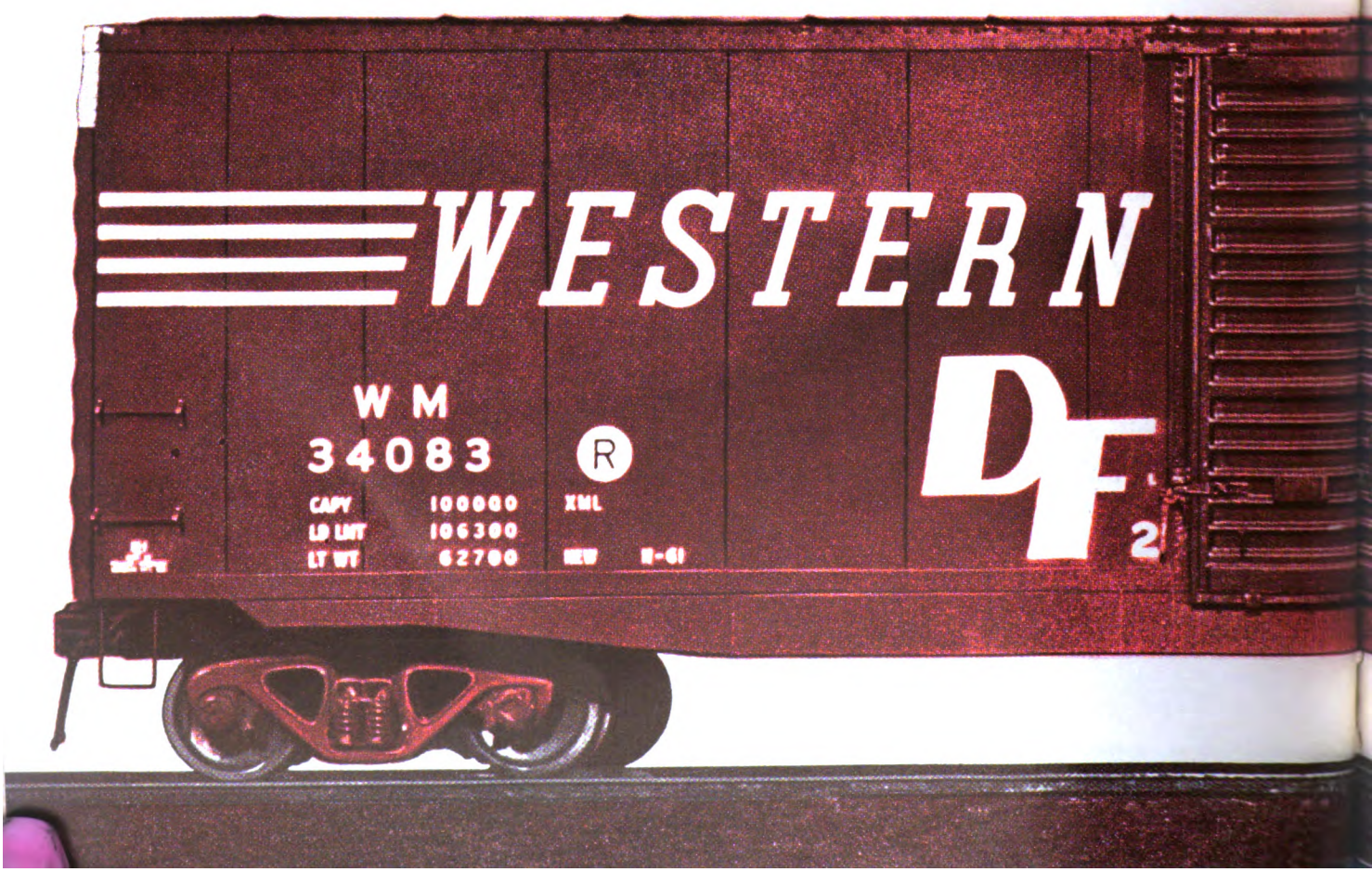
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over 50 Est. 1909 years' leadership in industrial cleaning

The progressive Western Maryland specifies WABCOPAC® brake units on new box cars



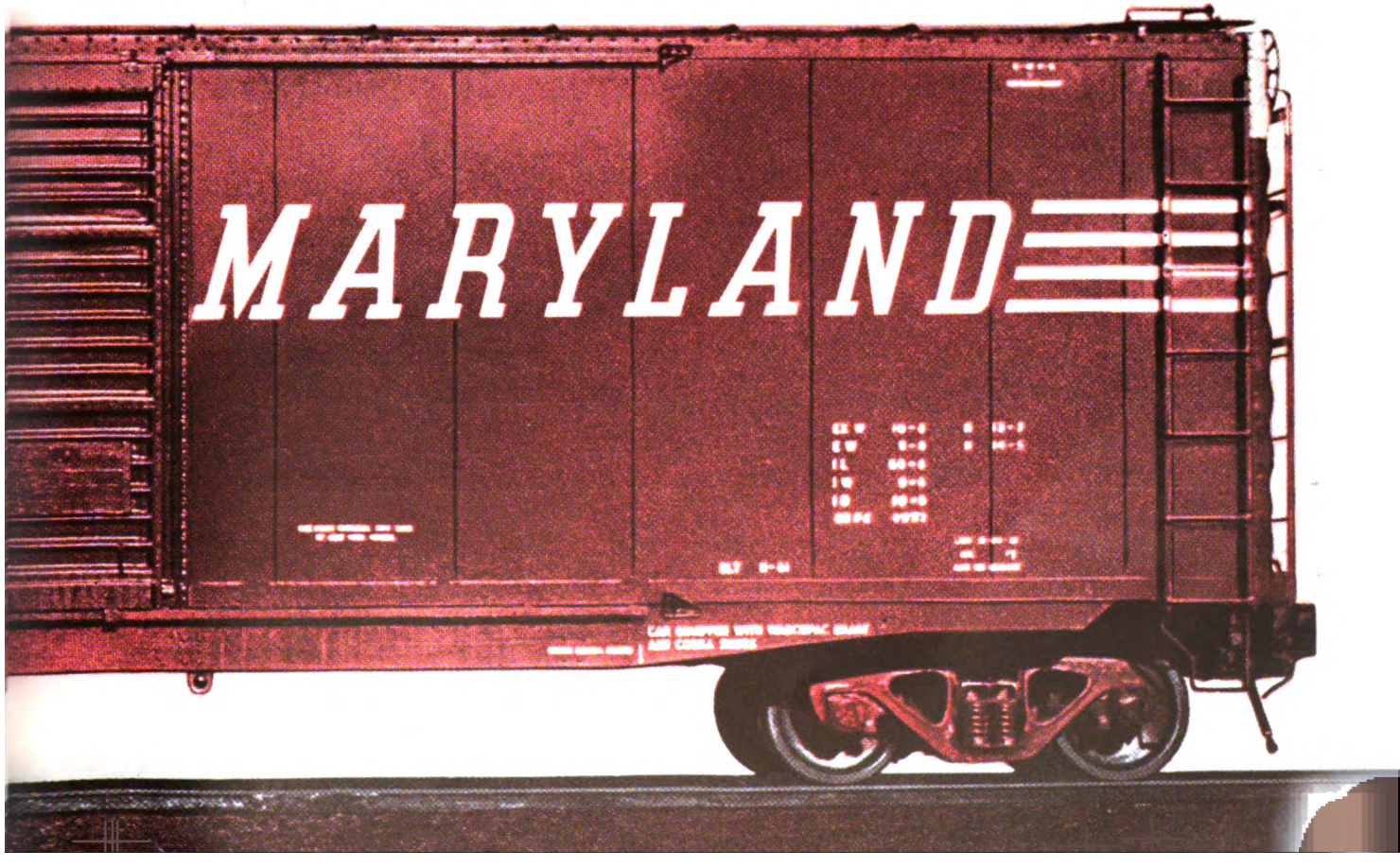


A good example of progressive thinking that prevails on the Western Maryland, is illustrated by their decision to specify WABCOPAC® Brake Units on a recent fleet of new box cars. Replacing a system of complicated beams, levers and rods running along the underside of the car, the Western Maryland utilizes WABCOPAC Brake Units that compact foundation brake parts into easily assembled truck components. Each truck assembly consists of two identical WABCOPAC Brake Units, each with a cylinder, joined by push rods and equipped with COBRA* Composition Brake Shoes.

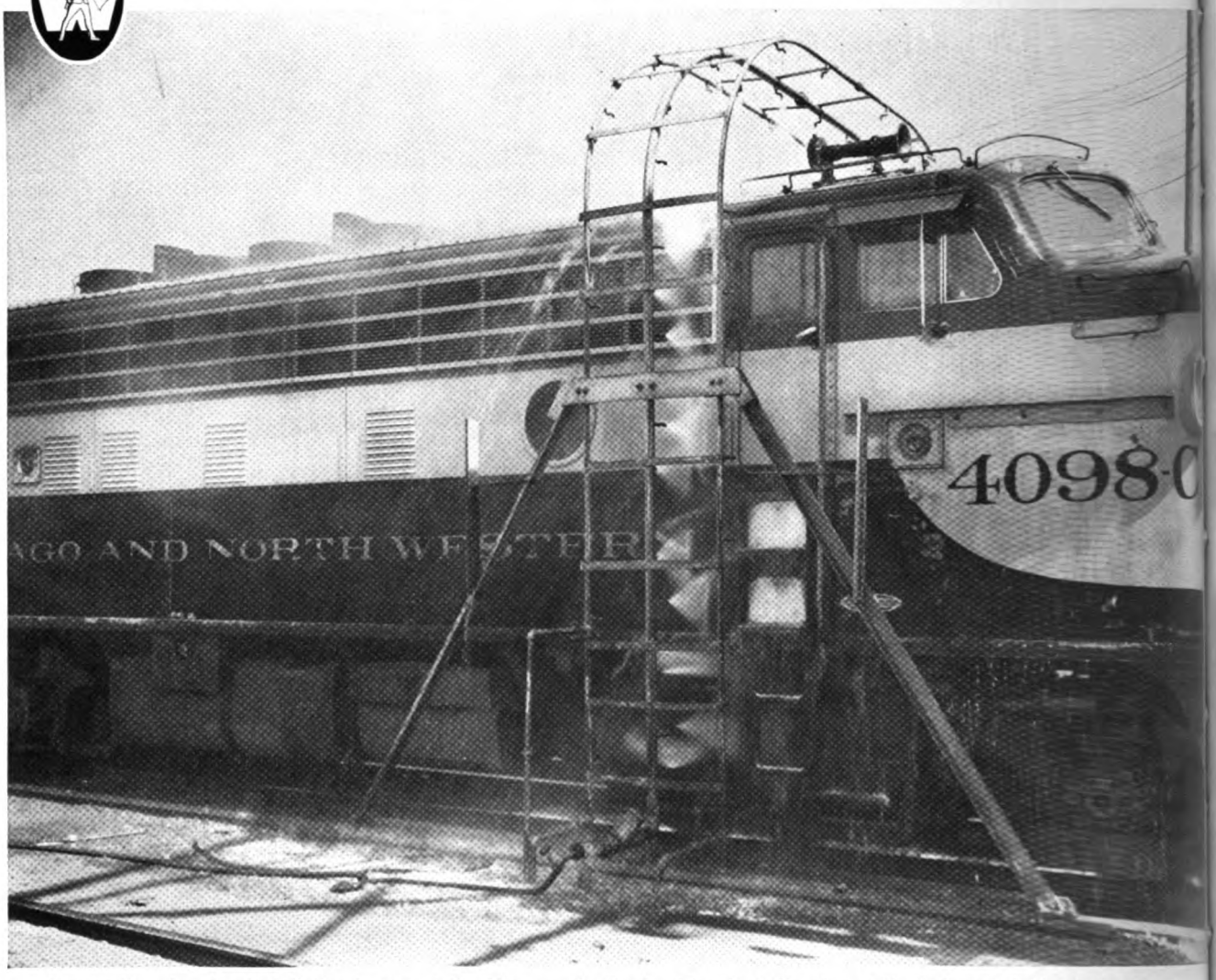
WABCOPAC Brake Units make it possible to lower car profiles and weights, and reduce brake rigging maintenance. Lower profiles permit greater overhead clearance for extra capacity cars. *Registered trademark of Railroad Friction Products Corporation*

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Locomotive cleaning installation in use at the Minneapolis Engine Terminal. Nozzles at the left and right apply cleaners. Center nozzles rinse. Nozzles below sills spray trucks, wheels and underframes with a completely different cleaning solution.

Can you clean your Diesel units, including trucks, for 90¢ per unit? . . . CHICAGO and NORTH WESTERN does

Wanting to maintain high appearance standards but reduce costs, the C&NW constructed this new facility at Minneapolis. They're getting sparkling units at 90¢ per unit for materials and labor.

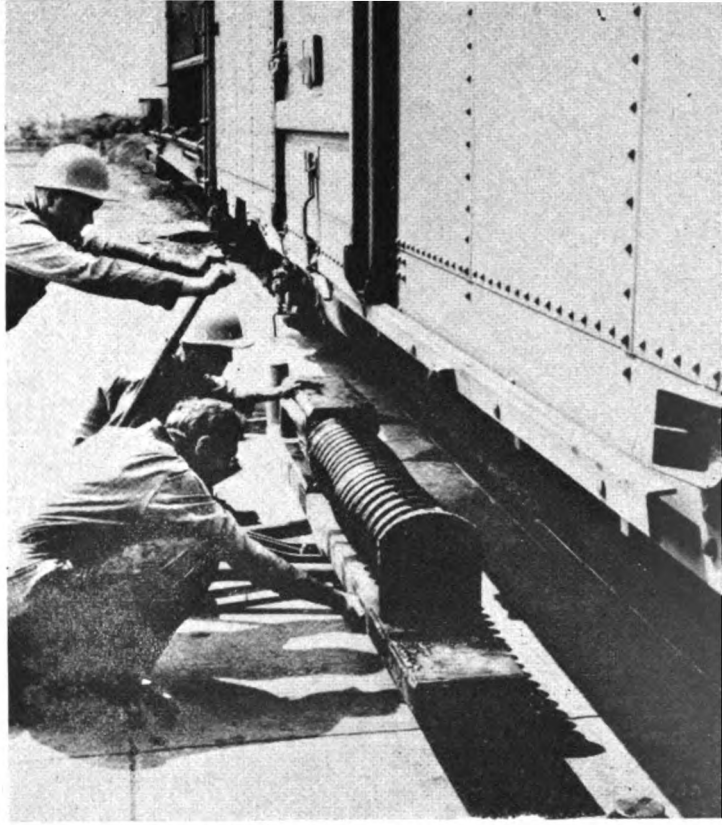
And Wyandotte helped all the way. One of our railroad cleaning specialists worked closely with Chicago and North Western's mechanical force in developing this excellent and effective low-cost procedure. Wyandotte 85 and 548 are used in combination to eliminate body dirt, while Wyandotte Rantier cleans trucks, wheels and underframes.

It's another example of Wyandotte's helpful assistance in railroad cleaning—the right products plus good service—backed by years of experience. We can do the same for you.

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3C Gliding Sill Can Be Applied To Existing Cars



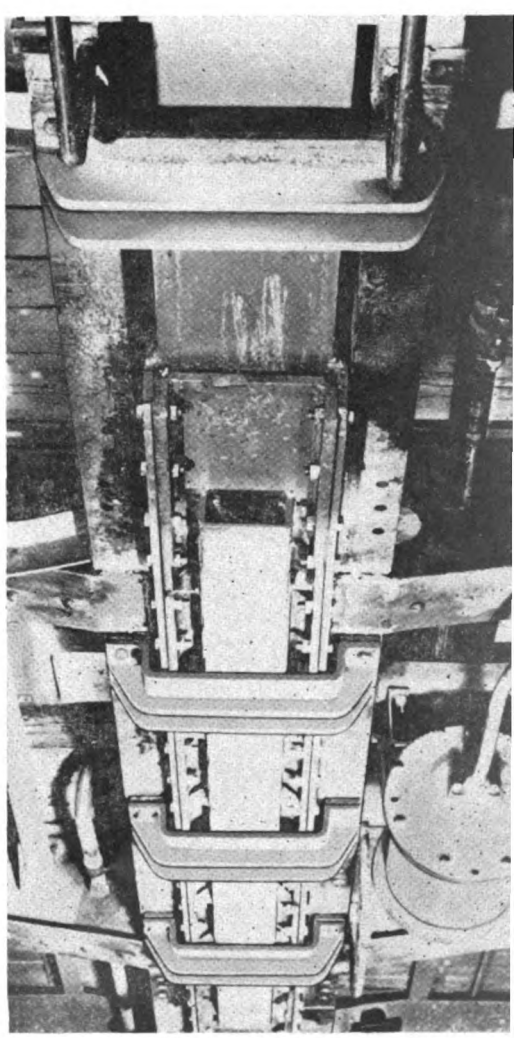
Hydraulic unit is easily installed into pocket in sliding sill.

The 3C Gliding Sill developed by National Castings Co. is applicable both to new and existing cars. This cushion underframe has already been applied to existing cars by eight railroads and more installations are scheduled to be made by other lines. The Western Pacific has had the 3C sill applied to ten new insulated box cars following tests with an existing car fitted with this sliding sill in 1959.

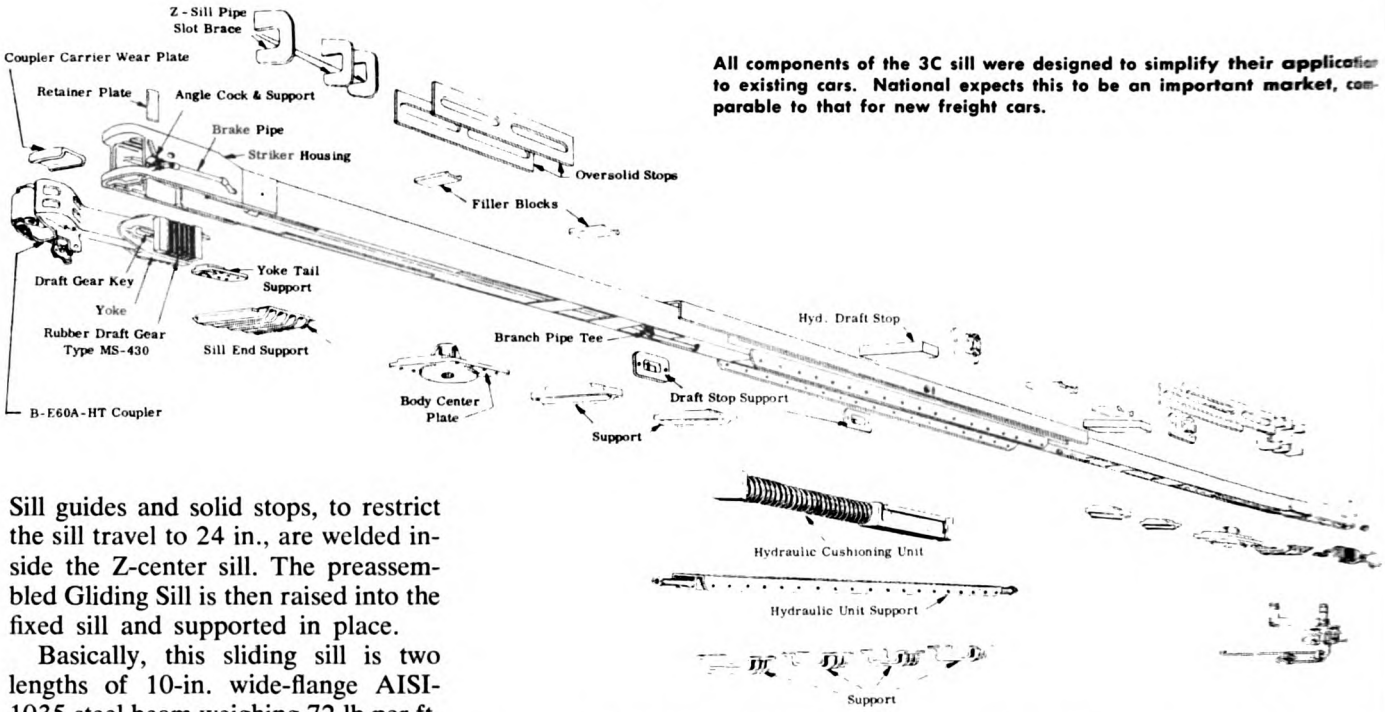
Recognizing that railroads would probably be incapable of ordering new cars with cushion underframes at a rate sufficient to meet shippers' growing demands for such equipment, National has, from the beginning, designed its sill for installation in the standard AAR underframe. This would make possible the use of the 3C sill in existing cars as well as in new cars built on carbuilders' standard underframe jigs.

Extensive testing has shown National that, compared to a standard car, the 3C-equipped car will reduce lading damage approximately 80% while simultaneously making possible the use of lighter materials in the car's structure and minimizing, or completely eliminating, the need for special load-retaining devices. The research program which has produced the sill was undertaken because of the lading and structural damage problems which railroads were experiencing. In 1955 no one in the industry could put his finger on the cause of the adverse action which took place during impact. Extensive testing to explore impact conditions was undertaken and, finally, the National Technical Center at Cleveland, Ohio, was able to determine exactly why lading was being damaged during impact. It was shown that reduction in coupler forces and increased energy absorbing capacity of the cushions do not automatically reduce forces developed within the lading. Next, it was proved that no adequate lading cushion could be fitted in the standard freight-car draft-gear pocket. This led to the choice of the sliding center sill with 24 in. of hydraulically cushioned travel in either direction from the neutral position. Not only is this the longest sill travel with which the AAR rigid-shank coupler can be used on cars 50 ft or shorter which must negotiate curves as sharp as 30 deg, but National found that increases in lading protection available from a longer travel sill were marginal.

For application to existing cars, all obstructions inside the Z-section sill are removed. Then, the Gliding Sill and attachments are applied as to a new car. For application to new cars, the car underframe is the same as for a standard car, except the structures inside the Z-center sill are omitted.



Sliding sill is supported in center sill by castings; hydraulic unit support is bolted.



All components of the 3C sill were designed to simplify their application to existing cars. National expects this to be an important market, comparable to that for new freight cars.

Sill guides and solid stops, to restrict the sill travel to 24 in., are welded inside the Z-center sill. The preassembled Gliding Sill is then raised into the fixed sill and supported in place.

Basically, this sliding sill is two lengths of 10-in. wide-flange AISI-1035 steel beam weighing 72 lb per ft, joined by a center pocket surrounding the hydraulic unit. One end of each beam is fitted with a high-strength striker casting which incorporates the end draft-gear pocket. The opposite end of each beam has the web sections removed, side walls slotted a distance of 32 in., and reinforced with four stiffener plates. The outer pair of stiffener plates transforms the WF beam into a box section, compensating for loss of compressive strength resulting from removal of the web section. The two inner stiffeners straddle the slots forming sliding-sill stops.

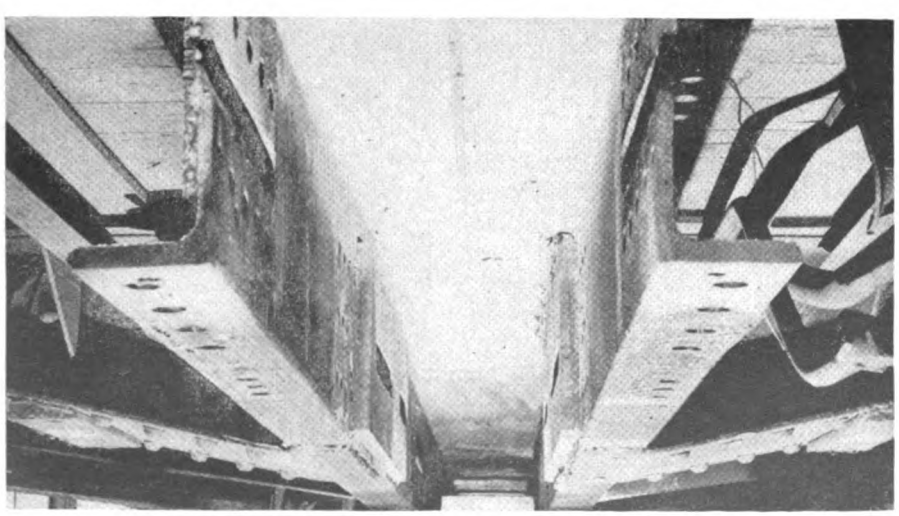
The two beam sections are placed 8 ft apart and are joined with top and side cover plates which form the pocket. The hydraulic cushioning unit fits into this 8-ft pocket which is $11\frac{11}{32}$ in. high and $10\frac{5}{8}$ in. wide. The bottom of this pocket is a removable section held in place with high-strength bolts, a design which facilitates application and removal of the hydraulic cushioning unit.

The sliding sill is placed within the standard center sill and is supported at each body bolster, crossbearer, crosstie, and end by a cast support. These sliding-sill supports also tie both sides of the Z-section sill together. At each end of the hydraulic pocket are horizontal stop keys which extend from one side of the stationary sill through the slot of the sliding sill to the other side of the stationary sill. These keys connect the carbody, through the hydraulic unit, to the sliding sill.

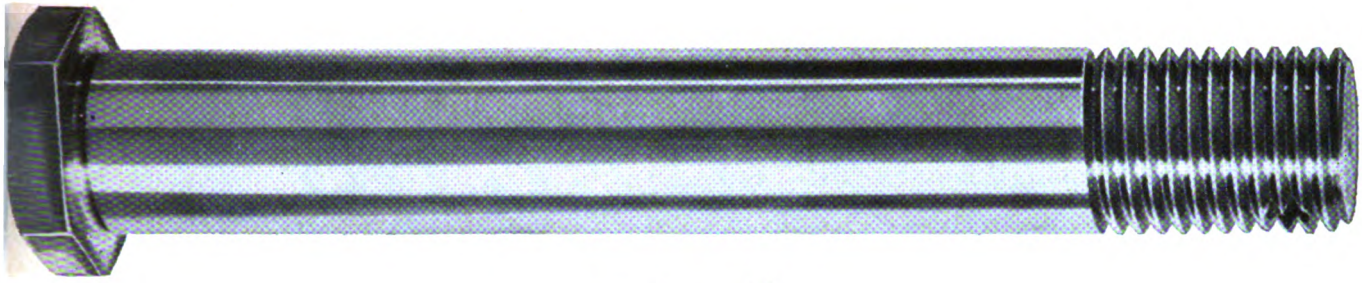
When the sliding sill is at center or neutral position, the hydraulic cushioning unit is expanded against the solid stops of the stationary sill and the sliding sill stops ready for impact in either direction. The sliding-sill stops, which are integral with the sliding sill, compress the hydraulic cushioning unit against the opposite key of the stationary sill during impact.

The hydraulic cushioning unit generates pressure by forcing oil through a controlling orifice. At the beginning of a compression stroke, the orifice is fully opened. As the piston passes through the cylinder, the orifice is gradually closed. The closure of the orifice is designed to retard the rate of piston travel and maintain the pressure developed. The hydraulic cushion never bottoms steel against steel, because it is designed for 26 in. of travel and the sliding sill is capable of only 24 in. of travel before it engages the oversolid stops. The sill is returned to its neutral position by a coil spring assembly.

The short-travel, rubber-cushioned draft gear at each end of the sliding sill has sufficient capacity to cushion against forces developed as a result of train action and to protect the sliding sill from excessive column loading when the sliding-sill car is impacted at the end of a string of cars. The metering of the hydraulic cushioning unit was designed on the basis of track impact studies with canned lading, providing protection to the lading and car over a wide range of car weights and impact speeds. *(Continued)*



Center sill is cleared for sliding sill application; slotted at ends; reinforced at bolsters.





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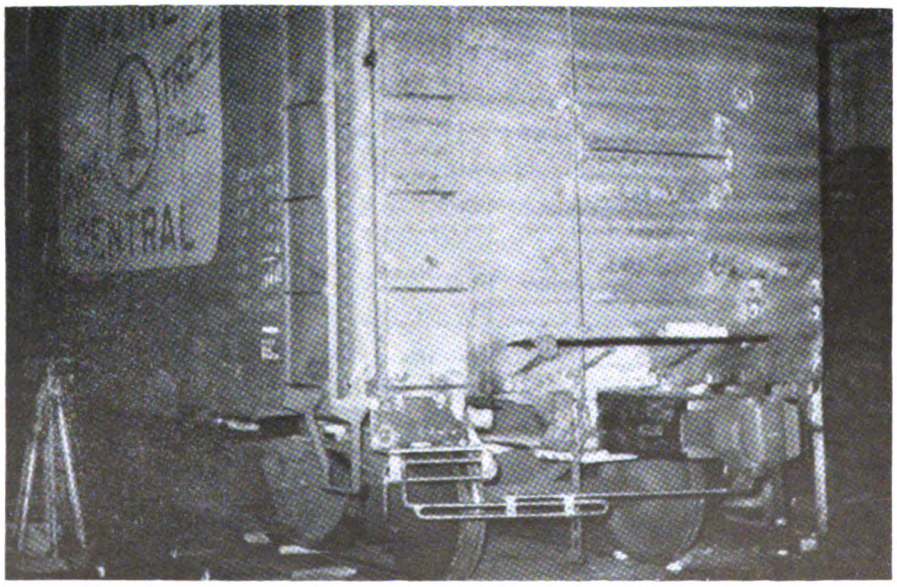
The ICC requires that any cars having long-travel cushions be provided with additional safety appliances. These consist of an extra running board and extra handholds on each end of the car, permitting a trainman to cross from one side of the car to the other without stepping on the sliding member. The brake pipe is carried on the sliding sill with a hose used between the branch pipe tee and the AB valve.



Burlington car underwent extensive testing in service following the application of first 3C sill. Customer reaction was good; no mechanical problems were encountered.



Testing of 3C sill applied to Western Pacific box car led to use of this sill on ten new WP insulated cars which were built earlier this year by Thrall.



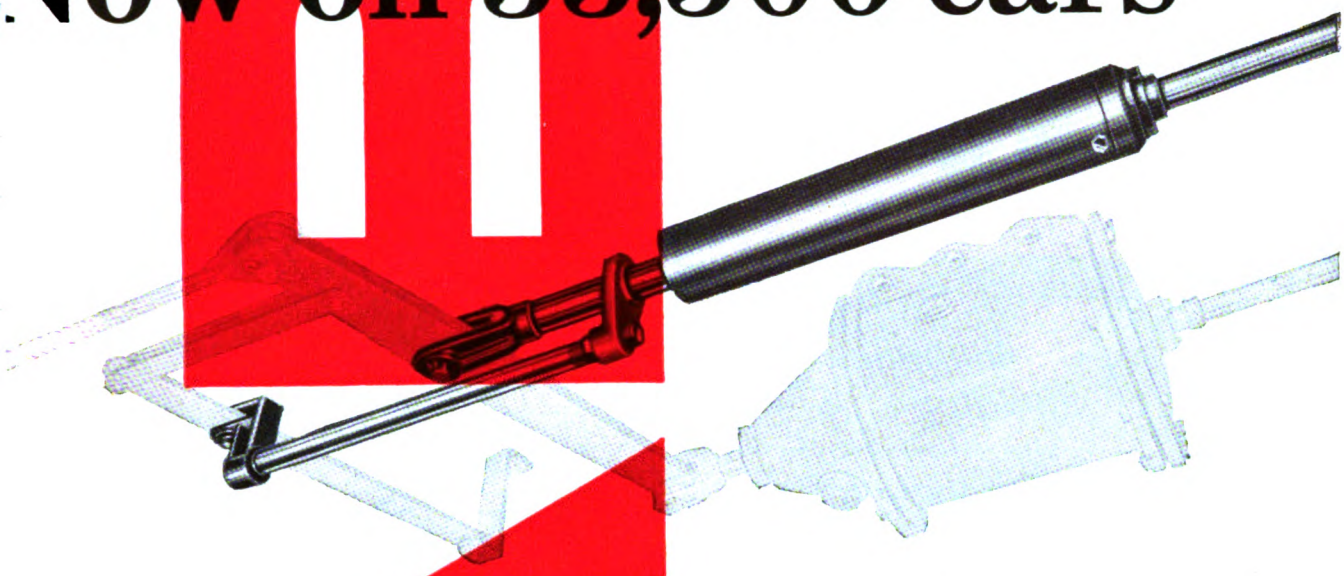
Maine Central shop at Waterville, Me., applied 3C sill to paper-service box car, making road one of first eastern lines to own hydraulically cushioned freight equipment.

Responding to impacts entering the car through the couplers, the 3C sill protects the car structure and lading from dynamic disturbances, both in classification yards and in train operation. The hydraulic unit is designed to travel nearly its full stroke over a wide range of impact speeds to provide lading protection throughout. The oil level in the hydraulic unit may be checked through a sight glass visible through opening in the side of the fixed sill. Should oil have to be added during the life of the unit, it can be put in through a plug adjacent to the sight glass.

The first 3C prototype, applied to a Burlington box car, was subjected to a comprehensive testing program. Electronic instrumentation measured impact speeds and forces, and accelerations and displacements of the sill, car and lading. The 3C car was impacted with the car empty, partially loaded, and fully loaded. Simulated and actual ladings were used. The car was tested as the impacting car as well as the struck car with back-up cars. An important item of the testing was the measurement of actual lading forces. Through specially designed load cells longitudinal and vertical lading forces at various locations were measured in a carload of canned goods. These forces were compared with reaction forces at the coupler to determine their relationship. Impact test on a Gliding-Sill car loaded with canned goods showed that at the average classification yard impact speed of 8 mph, both coupler forces and lading forces were reduced about 80% compared to cars with standard friction draft gears under identical conditions. The tests also showed a similar reduction in vertical lading displacement developed in the car.

Following the laboratory test evaluation of the Gliding Sill, prototype cars were put into selective service. With one shipper's movements of packaged cereal, the 3C-sill car reduced lading damage by 90% compared to standard draft-gear cars in the same service. Other road service has included shipments of canned goods, newsprint, tinplate and automotive stampings—all damageable items. Roads now operating 3C cars, in addition to the Burlington and Western Pacific, are the Maine Central, Grand Trunk Western, Pennsylvania, Louisville & Nashville, Atlantic Coast Line, and Great Northern.

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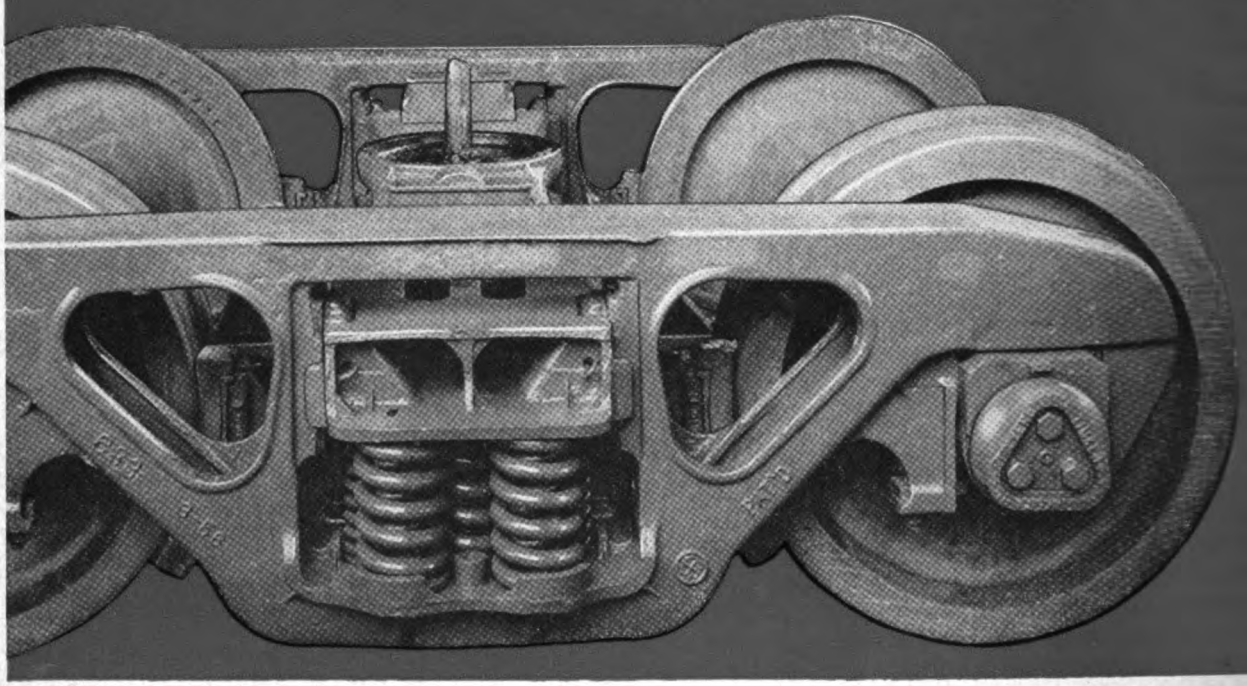
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ı Electrical Maintenance Problem...

ian Copper Dragging Be Overcome?

. K. R. Matz

e of the phenomena encoun-ed with rotating electrical equip-nt is copper dragging of com-ıtators. It is found most fre-ently on the main and auxiliary ıerators of diesel-electric loco-ıtives, probably because the natures of these machines, be-ş driven by the engine, rotate in ly one direction. Causes of cop-r dragging are not easily deter-ned or explained, and there are ıumber of theories for its occur-nce. Because copper dragging n be an important factor in ma-ine maintenance, however, its uses and cures should be con-lered by those responsible for romotive electrical equipment.

Copper dragging appears as a reddling-out of the trailing edges of ommutator bars and progresses to a age where slivers of copper com-etely bridge the slots to adjacent ars. When contact is made with the ext bar, the copper burns out much a fuse would melt. Pockmarks usu-ly develop on the edges of the two ars when this occurs. All pockmarks re not necessarily caused by copper ragging; some may result from flash-vers. Operating conditions, cleaning rocedures, and selection of brushes ll can effect copper dragging. Copper ragging is very rarely seen on trac-on-motor commutators, probably ecause of the sloughing-off effect of eversing the direction of rotation. Main and auxiliary generator commu-ators most frequently develop these onditions, requiring extra and un-cheduled maintenance.

In general, it is well to look at the notors on a unit with a flashed gener-tor, even though there is some evi-dence of copper dragging. Careless handling or a wheel slip may have caused a motor to flash, thus flashing the generator.

Although several theories on copper dragging have been proposed, this much is certain: copper cannot be worked without mechanical force. Loss of the film laid down in commutation increases brush friction, as evidenced by copper dragging on several generators which had been allowed to idle many hours at no load. On the other hand, brush operation at very high current densities for prolonged periods can also puncture, destroy or burn off the film, producing the same high friction or heat considered chiefly responsible for copper dragging on commutators.

Some persons have recommended removing some of the brushes from the studs to increase current density and lay down more film. This should never be done without the approval of the machine manufacturer because it may seriously affect operation. Because generator loads are seldom predictable, removing brushes is inviting trouble. One of the reasons advanced for brush removal is fantastic in that it proposes brushes be removed from only one polarity. Actually, applying brushes of the right grade may be a simpler and more effective remedy for such a condition.

Other Theories

There is another theory that copper dragging may be the result of a resonant condition between the main generator and the diesel engine crankshaft. At the present, it does not seem that facts substantiate this as a major factor. Copper dragging troubles have been severely aggravated by oil-laden and "dirty" atmospheric conditions around generators. By cleaning up the engine rooms of its locomotives, one railroad overcame these conditions and greatly reduced an epidemic of copper dragging and flashovers which it was experiencing.

Aside from improper selection of brush grade, the principal cause of threading and copper dragging on auxiliary equipment (exciters and auxiliary generators) is oily dirt. When permitted to collect for months, such dirt eventually forms an excellent lapping compound. Picked up and embedded in brush faces, oily dirt can cause trouble even though an otherwise satisfactory brush grade is used. A part of the trouble may stem from casual maintenance of the commutators on auxiliary equipment which is certainly fostered to some extent by their inaccessibility. In units having two auxiliary generators operated in parallel, as is the case on passenger units, an oily film can prevent the formation of a uniform commutator film on each generator, increasing the tendency for unequal loading and, indirectly, the troubles incurred when a brush grade is operated above or below its intended rating. Operation at rated current is important in all types of rotating machines.

Basic Cause

In the final analysis, the basic cause of copper dragging appears to be a skin-like layer of annealed copper formed on the commutator bars by highly localized heat through pinpoint sparking over months or years of normal operation. To establish the validity of this theory, experiments have been made with commutators on which copper dragging had been very severe. Commutators were turned down slightly more than is normally done when copper dragging appears, removing this annealed skin. As a result, these commutators then operated for a long period with no more copper dragging.

Work by National Carbon in the field confirms the effects of time, temperature, and service in the development of copper dragging on main generators. Similar work, done by a major railroad, compared the severity of copper dragging as related to the way the commutator was handled when the condition was discovered. Generators which were slotted to remove the dragging, but were not stoned, were again in trouble in approximately three months. Generators which were jig-

---

Mr. Matz is manager railroad brush applications, National Carbon Co., Division of Union Carbide Corp. This article is based on a chapter in a recently published pamphlet, "Brush Performance on Railroad Locomotives," which is now available from National Carbon. Remainder of the material in this booklet was taken from a series of thirteen articles on brush selection and operation prepared by Mr. Matz and published in Railway Locomotives and Cars from March 1957 through April 1958.

stoned showed no more copper dragging for approximately one year after this had been done.

For some time brush manufacturers have been working to develop a brush grade which will operate for a longer period without copper dragging. One development has been a new brush producing an improved film stability.

Field work done by the author on one road where copper dragging had become chronic and on another where it was increasing proved the value of jig-stoning. To prepare the genera'or commutator, the following steps were taken:

- All brushes were removed from the commutator, leaving at least two adjacent studs to start the engine.
- A jig-stone rigging was installed in the "ten o'clock" stud position, and the stone was properly set. A medium grade stone equivalent to the Ideal medium coarseness grade was used. Stone did not touch commutator at first.
- After the engine was started and set at idle speed, stoning proceeded, using different grades in sequence, based on commutator condition. The job was considered complete when a canvas wiper applied to the rotating commutator no longer showed any trace of brush-path marks.

Other Factors

While this method of stoning is a practical way to do the job, it is not necessarily the only way. It is recommended that the equipment manufacturer's general instructions and safety precautions be followed. In all cases, the proper tolerances for slot-depth limitations must be observed.

Although work is being done to stabilize the commutator film, prolonging the period of freedom from copper dragging, it is generally a that proper stoning, combined the proper brush grade, can now the most immediate long-range fit. When copper dragging becom problem, brush life in terms of sa on brush costs is a minor factor w compared with the cost of cleanin main generators damaged by cop dragging and flashovers. Of prim importance is the ability of a br grade to keep a commutator in g condition for the longest possible Brush life is secondary. One grad brush that can retard the develop of copper dragging is that so extre abrasive that it causes the commut to operate "raw." In this case, commutator eventually becomes deeply ridged that it is necessar stone off large amounts of cop Such a brush gives only tempo relief, ultimately contributing to greater maintenance costs.

Pennsy Gets First U.S. Silicon-Rectifier Unit

(Continued from page 38)

Department. The cells, 4JA90M units, are rated at 250 amp, 600 prv (peak reverse voltage) repetitive and 800 prv transient. The 4JA90M is an all-hard-solder, double-diffused PIN rectifier. The silicon rectifiers are mounted in 16 panels of 24 cells per panel and are connected both in series and parallel to form a bridge circuit with 96 cells per leg.

Development of the cells for the fluctuating-load conditions found in locomotive service required a new fabrication technique. Changing load conditions in locomotive service resulted in thermal fatigue in the soldered electrical connections of early silicon wafers, GE engineers reported. The thermal-fatigue breakdowns were subsequently overcome with hard solder. The possibility of hot-spot failures of the cells was also reduced by making them by the double-diffused process, providing more even distribution of current density in the silicon pellet. Surface treatment of the cells permits them to withstand higher reverse voltages, providing a safety margin for peak reverse voltage transients.

The silicon rectifier is one of the family of junction-type semi-conductors that has made rapid progress in various railroad applications during recent years. The rectifying action of the semi-conductor is accomplished in the interior of a crystal of some semi-conductor substance, such as silicon or germanium. Rectification occurs at the junction zone of two types of impurities diffused into the crystal from opposite sides. An "N" type impurity introduces an excess of electrons on one side of the junction. A "P" type impurity causes a deficiency of electrons (commonly called "holes") on the other side.

Electron Flow

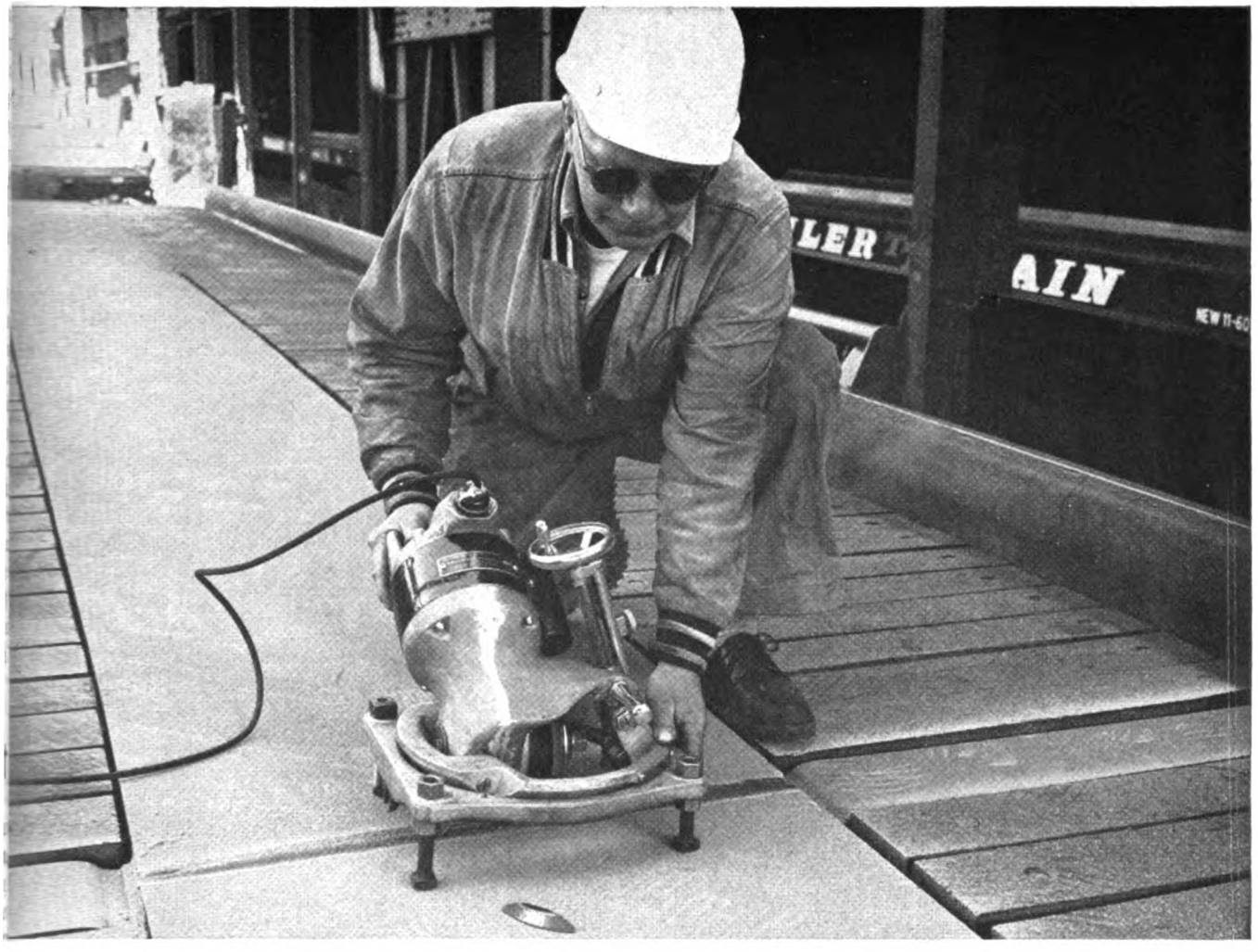
Electrons flow easily across the junction when a low voltage is applied in one direction (forward polarity). Voltage in the opposite direction (reverse polarity) drives the electrons and holes away from the junction, leaving an electron "desert." Current flow is extremely small even when reverse voltages of as much as 1,000 volts are applied.

The "solid-state" rectifiers have a built-in supply of electrons. In vacuum tubes, electrons must be "boiled off" a red-hot filament, which is both delicate and wasteful of power. In ignitron tube rectifiers, a pool of mercury must be "ignited" by an arc, much like an automobile spark, to secure a supply of electrons.

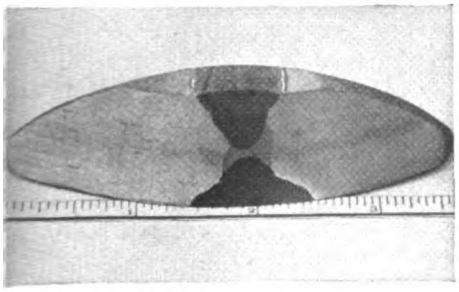
Any of these two-electrode devices (diodes) convert alternating cur to pulsating direct current. The s plicity, efficiency and long life of semi-conductor type present attrac advantages over tube-type rectifier

The 384 silicon rectifiers, 24 panel, occupy a 6-ft length of the l motive carbody as compared t 9-ft space occupied by the ignitr Because of their rugged mecha characteristics, the silicon rect banks can be bolted directly to the comotive frame, while the ignitron quire elaborate shock mounts. cause the silicon rectifiers can b cooled, with air coming from the re lar cooling-air system through a s cleaner, the water-cooling sys needed with the ignitrons is elimina The ignitron-equipped units ha complete water-cooling loop con ing of radiator, pump, temper controls, heater protection, pip hoses and fittings. The cooling w must be of high purity with anti-fr required in winter. Load divider c cuitry is considerably less complic with the silicon-rectifier installatio

Substitution of the silicon rect does not affect other component these locomotives. The main tr former, smoothing reactors, trac motors, controls and auxiliaries are same as those used on the ign units.



Quality control at work on a Bethlehem 85-ft flat car



This 4-inch weld specimen gives inspector good look at weld quality. If it shows defects, a new weld is carefully supervised, and immediate steps are taken to correct the problem at the source. This is but one way in which Bethlehem upholds high level of quality on all freight cars.

What's this? Deliberately cutting up the center-sill cover-plate on a brand new piggyback flat car?

That's exactly what he's up to. He's holding a weld-prober, which cut the little boat-shaped specimen from the buttwelded joint in foreground. The specimen gives this quality control engineer a good look at the workmanship in the weld. If he spots any defects, such as slag inclusions, cracks, porosity, lack of fusion or penetration, he'll know what to do about them—*and he'll do it.*

The soundness of every weld and the quality of each part are essential to the service life of a whole freight car. That's why Bethlehem's quality control engineers are in the shops at all times, checking on every detail of construction, helping to overcome difficulties, often suggesting improvements.

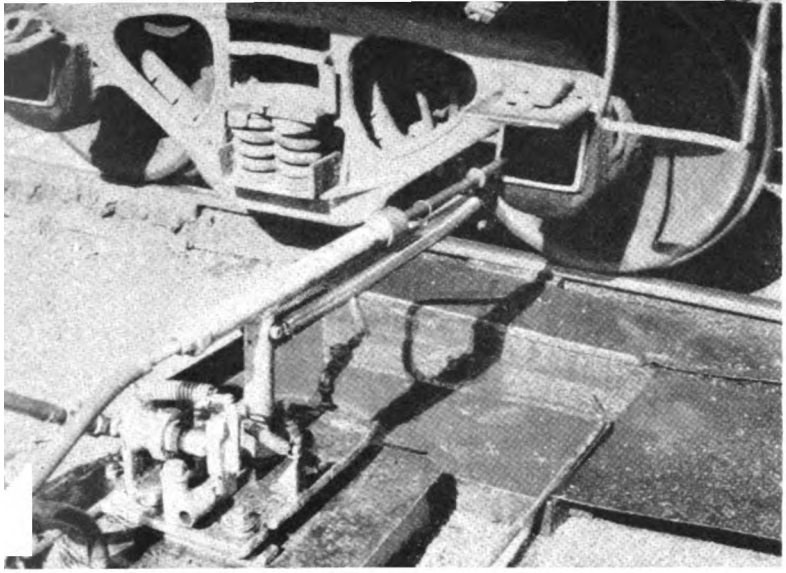
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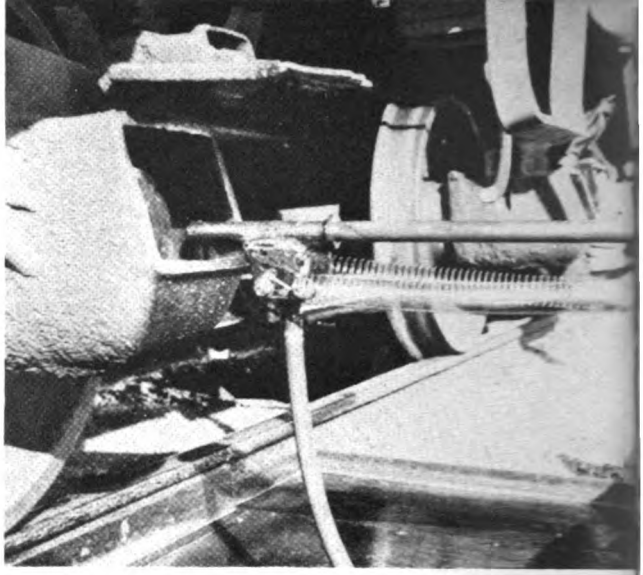
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Track switch starts the oiling; lance is extended into box opening.

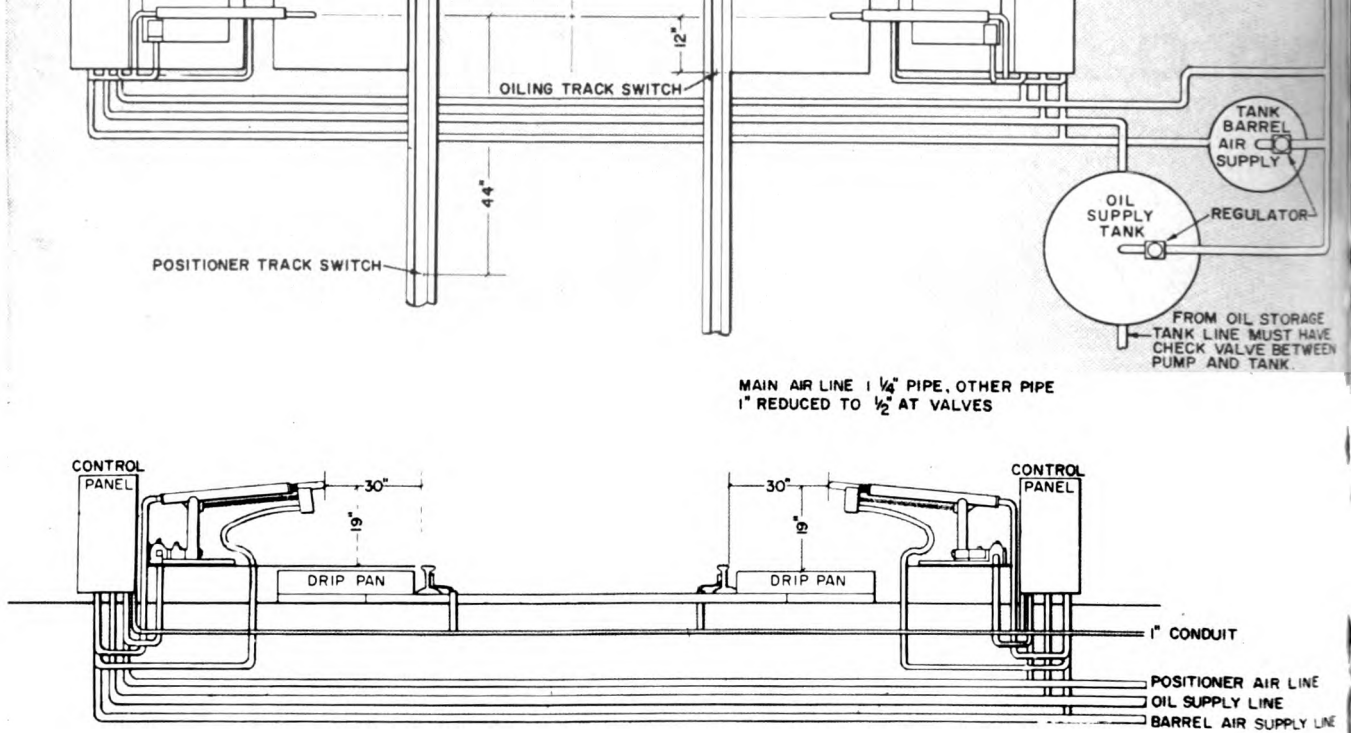


Deposit of oil is followed by spring retraction of lance.

Frisco Oils Journals Automatically

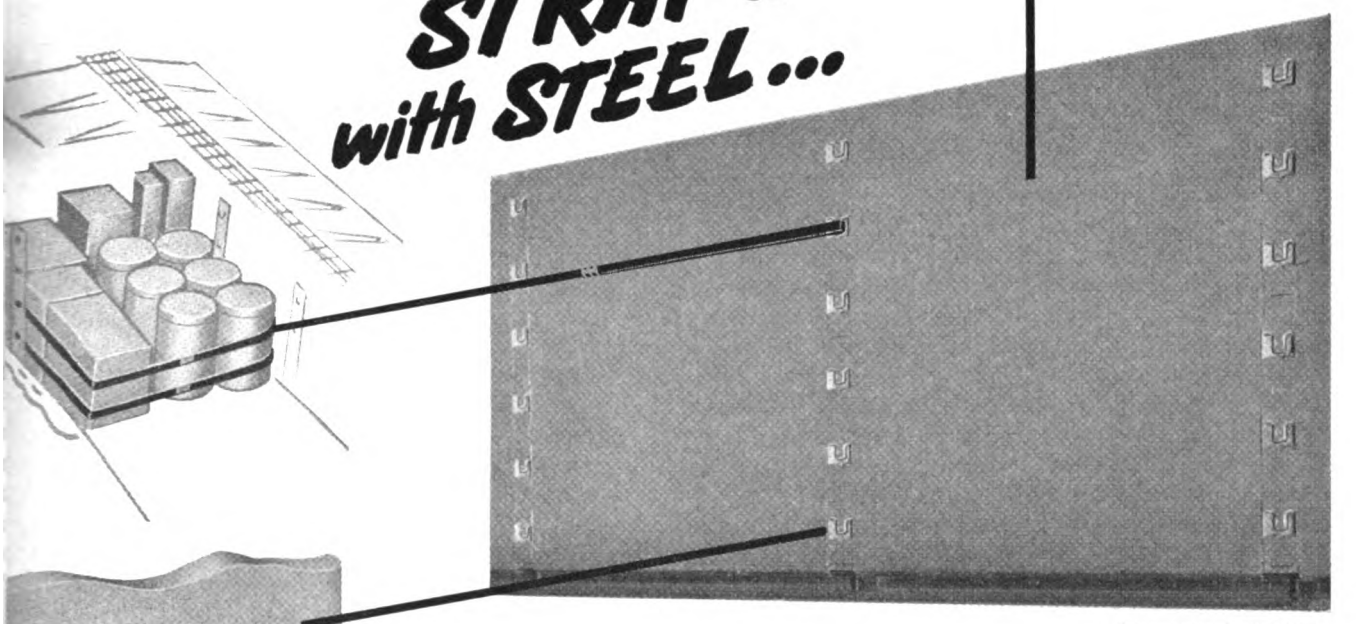
Its semi - automated journal - box oilers enable the Frisco to expedite a previously time-consuming, but important, task in train make-up. After a year's experience with its first semi-automated oiler in Tennessee Yard at Memphis, Tenn., the Frisco installed a second unit, incorporating new features, at Cherokee Yard, Tulsa, Okla. These two oilers have eliminated eight oiling stations at each yard. Although producing substantial savings, operation of the oilers did involve considerable oil loss. Further study and experiments were undertaken to correct this

The redesigned oiler, known as th Hall-Martin type, has not eliminate any additional oil stations, but has cu oil spillage, yielding further saving According to E. F. Tuck, chief me chanical officer, "the device has prove



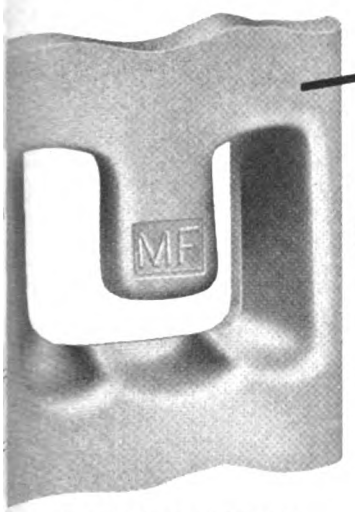
WRAP it in STEEL,

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Independent survey reveals wood lining maintenance averages $80 per car per year!

and ANCHOR it with M·F



Tongue design eliminates threading, gives constant tension, instant release. Note self-cleaning feature.



at right: M·F Door Post Anchor

CARRIERS: Smooth, batterproof steel is a *permanent*, NO maintenance lining.

M·F anchors in *any* style — continuous bar or individual; open-tongue, or closed; for steel, wood or plywood; for *any type of car;* in *as many* locations as desired — *always protect the lading and the lining!*

SHIPPERS: Smooth, splinter-free steel protects the *lading.*

M·F anchors, flush with the lining, offer NO projections to rip bags or damage cartons, crates and cans.

414A

an M·F car is a Maintenance-Free car

MACLEAN-FOGG LOCK NUT COMPANY

1835 N. Wolcott Ave. Chicago 40, Ill. EDgewater 4-8420 / IN CANADA: THE HOLDEN CO., LTD., MONTREAL

GEARED TO PROGRESS RPI MEMBER

satisfactory and has been of great value in properly oiling cars."

The device operates most successfully when cars move up the hump at speeds from 1.5 to 3.5 mph. As the cars roll by, a nozzle moves into the openings of the plain bearing journal boxes which have lids open. A fixed quantity of oil is deposited. This quantity depends on the time of the year, it having been found that 4 oz in winter and 6 oz in summer give the best results. The quantity is set at a regulator on top of the supply drum. After the oil has been discharged into the box, the delivery lance is retracted from the box opening.

The oiler has a positioner that compensates for speed variation. Manual control is needed to override the automatic system when cars having roller bearings, or those with box lids closed, pass over the hump. Manual override must also be operated when reverse movements are made over the hump. Solenoid valves, activated as wheel treads pass over a track switch, control the oiler. When the switches close the valves open, allowing air pressure to move the oiling guns into the box for discharge of oil. When the measured amount has been released, the gun retracts to its original position by the spring.

The Hall-Martin oiler now in use at Tulsa and Memphis was developed by J. H. Hall, Frisco master mechanic at Sherman, Texas, and J. T. Martin, assistant master mechanic at Tulsa.

Hot Box Detectors Have Major Role

(Continued from page 29)

place full reliance on them. Efficiency figures for these devices are the result of a careful analysis which is made regularly, based on the report which must be prepared for each high-temperature journal indication given by each detector. This report includes information on the time and weather, location of the box on the car, type of lubricating device, and latest repack information. The car inspector uses a Pyroprod thermocouple-type heat measuring instrument to determine the temperature of the journal and housing, recording this information on the report along with the heights of the deflections on the detector's chart both for the defective box and for the normal boxes in the train. The report is completed by the repair forces, indicating what defect was actually found and whether it was repaired in the yard or in the train.

The line-of-road detectors are basically transportation department tools, but hot-box indications produced by these devices are also analyzed to determine their effectiveness. The indications from these devices are relayed to the nearest tower, or to a dispatcher's office from which a stop signal can be given so that the train crew can be informed about the location of the defective car in the train. If the trainmen's inspection indicates that there is actually a hot box, the car is normally set out.

At the line-of-road detectors there are no adjacent mechanical department installations and, consequently, no repair forces which can be available on a short-call basis. A survey of the hot-box indications for these line-of-road detectors recently showed that some abnormal journal condition actually existed in 74% of the cases in which trains were stopped.

In addition to filing reports on each hot-journal indication, the overall performance of each detector is analyzed by asking those responsible for examining its tapes to rate its performance. Whether the device performed satisfactorily, whether it produced a usable trace on the tape for each side of each train, and whether it required repairs during each 24-hr period are all recorded. These reports are summarized monthly. Based on effective operating days, the efficiency of all N&W detectors was 90% for June 1962. For different installations the individual efficiencies ranged from a low of 73% to a high of 100%. According to the N&W signal department, which is now responsible for the maintenance of these devices, this performance is achieved at a much higher maintenance cost than that for other types of more conventional signal equipment. Detectors produced by Servo, General Electric, and General Railway Signal are in service on the road.

The steady improvement in journal performance will not eliminate the need for detectors, according to N&W mechanical officers. While hot boxes dropped from 280 for the first five months in 1959, with an average of 225,869 miles per set-off, to 125 for the same period in 1962, with an average of 2,855,677 miles per set-off, it cannot be assumed that eventually all bearing and journal failures will be eliminated. Already detectors have indicated potential and actual roller bearing failures both on N&W and foreign cars.

The hot boxes which occur on pad equipped cars are much more difficult for trainmen to detect because they emit little or no smoke even when high temperatures are being generated. In addition to this, the longer, faster freights which are now being operated make visual monitoring more difficult. This is indicated by the number of complete journal failures, or burn-offs, which have not decreased nearly as rapidly as has the number of hot boxes.

N&W Hot-Box Record

Miles per set-off—System and foreign cars

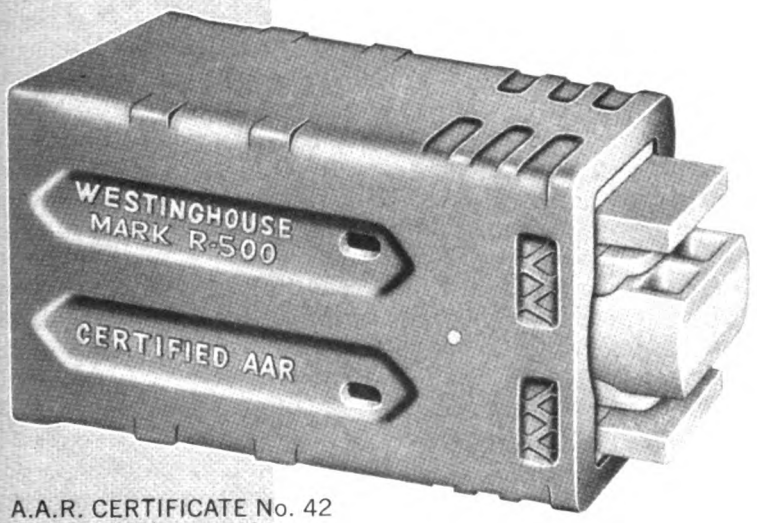
	1960	1961	1962
January	1,281,689	2,991,723	2,524,589
February	1,314,223	1,950,014	2,416,200
March	1,119,788	1,893,722	2,319,096
April	1,222,868	3,335,917	4,248,686
May	2,550,936	3,089,394	3,608,941
June	1,638,782	2,548,511	—
July	1,133,542	1,508,895	—
August	1,485,175	2,332,814	—
September	1,545,024	2,653,487	—
October	2,339,373	2,639,354	—
November	2,653,288	4,528,586	—
December	1,592,679	2,455,175	—

For real damage-cost-cutting protection behind the coupler



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WESTINGHOUSE
MARK 50
FRICTION DRAFT GEAR



A.A.R. CERTIFICATE No. 42

WESTINGHOUSE
MARK R500
FRICTION-RUBBER DRAFT GEAR

Your choice of these two Westinghouse gears which substantially exceed A.A.R. specification M901E-59!

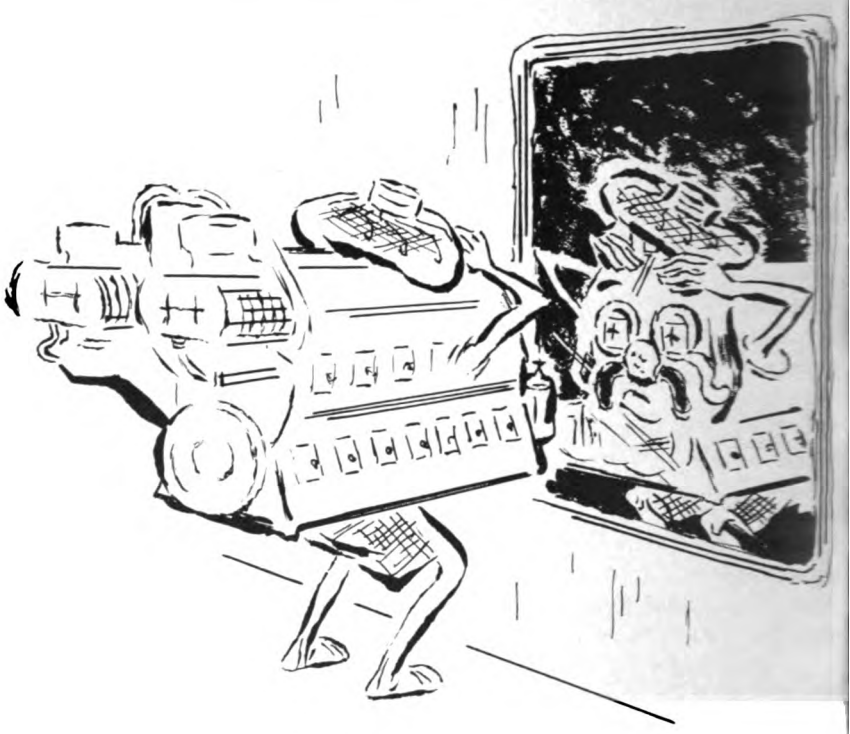
These two standard 24⅝-inch pocket draft gears were designed to sharply reduce damage claims. MARK 50 is an *all-friction* gear; MARK R500 is combination *friction-rubber*. Use either one with confidence.

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This Mirror Reflects the Condition of Diesel Engines



By Gordon Taylor

Centerville diesel shop had a widespread reputation for its diesel maintenance methods. Some mechanical officers from another road were visiting the shop. Doc Watts had just demonstrated his road's use of "meggers" for checking the insulation of motors, generators, and power wiring. "It's like this," said Doc; "proper operation of the electrical system depends on proper insulation values in that system.

"When we megger traction motors and their wiring circuits, the device sends test currents to all parts of the system which detect any weak spots that might not be able to withstand strains imposed by high voltage power. Many times we find conditions that, unless corrected, would lead to road failures. Many times they can be corrected by proper cleaning, by drying, or by treatment with insulating paints and materials. In this business we need all of the warning signals we can get so that we can keep our diesels in top operating form."

"Why doesn't someone devise a test device that will do for the diesel engine what meggers do for the electrical system?" asked one of the visitors.

"Well," replied Doc, "we have successfully used for several years a method that tells us much about the condition of our diesel engine. Regular analysis of lubricating oil samples enables us to correct mechanical conditions before they progress to the point of failure.

"In its continuous flow through all points of wear in an engine, diesel lube oil can hardly avoid bringing back some news of what is taking place. You can readily appreciate that this oil is not only the engine's life blood, but also that in its travels it becomes a mirror that reflects the engine's mechanical condition. If the engine has a defect such as a fuel leak, a water leak, scored bearings, or ring blow-by, there will be finger prints, figuratively speaking, in a sample of the crankcase oil.

"Just as it takes an expert to identify finger prints, it takes a trained observer to interpret the messages carried by lube-oil samples. We regularly submit samples of crankcase oil from each diesel unit to our laboratory. These samples are checked and the results immediately sent back to us with recommendations for any corrective action required.

"Different roads have different ideas about lube-oil sampling, but here we think each road unit's lube oil should be sampled weekly; each switching unit, monthly. Some roads take samples a couple of days before locomotives are due for mileage inspections. This gives the laboratory time to get reports on oil samples back to the shops in time to use them when the locomotives come in.

"One of our units came to its maintenance terminal six days after going into service following rebuilding of the engine. Tests of the lube oil revealed a chromium content, indicating leakage of cooling water into the engine lubricating system, because this unit did not have chrome-plated liners. While there was no water in the oil sample, the chromium indicated the presence of the chromate cooling-water treatment. Although the oil was still fit for use, the laboratory recommended that a search be made for a water leak. No water leak could be found during a close inspection. The foreman decided the chromate must have been a hangover from some leak that had been repaired at some other repair point, but not reported. The unit was then dispatched for service.

"About ten days later the unit returned to its home maintenance point, arriving late one night. The lubricating oil was extremely dark and thick. A sample, tested in the shop's Visgage, was found to have extremely high viscosity. The foreman decided the oil was unfit for further service and in-

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

structed that it be drained and replaced with new oil. A new set of filters was installed, and the suction strainers were cleaned. A sample of the lube oil was sent to the laboratory.

"This diesel unit was dispatched early the following morning before the oil sample could reach the laboratory. When the oil sample was received it was promptly tested and found to be free of water but loaded with chromium and metal particles. The test engineer called the diesel shop to warn against use of this locomotive until the water leak had been corrected and the engine bearings checked. The warning came too late. At about the same time a report came in that the unit had failed about 40 miles out. The engine had shut itself down and was found to be badly damaged. That really revolutionized the handling of lube-oil samples here. It established to everyone's satisfaction that the test department could furnish worthwhile information.

"I know you are wondering why a water leak that could cause so much damage could not be found readily. The water leak was very slow; so slow that the water could be evaporated by the heat of the engine as it entered the crankcase. Hence, there was no free water to be found in the lube oil. There was, however, a continual build-up of chromate in the cooling water. The action of the chromate on the detergents in the lube oil resulted in rapid oxidation of oil and the formation of sludge which ruined the oil as a lubricant. This caused the scoring of the engine bearings.

"Now a word about the location of the water leak. After the engine failed, a very thorough inspection was made. Nothing was found until the engine was filled with water which was kept hot by steam. The 'hydrostatic' test that was made revealed the cooling-system leak was at the No. 1 cylinder head. Here there was a very slow, but constant, leak through the threads of the stud holding the injector crab.

"This happened several years ago, but it produced the respect which we have for the signals given by oil samples. Today, the improved testing apparatus and methods used by our test department are virtually certain to detect the signals carried by the lube oil.

"We have found our lube-oil samples can indicate not only cooling-water leaks, but also such conditions as oil leaks, improper functioning of lube-oil filters, poor combustion, oil oxidation, bearing damage, worn liners, and scuffing of blower rotors. In fact, there is little a diesel engine can hide from its lube oil. It does, however, take trained observers to interpret and evaluate the signals contained in the lube-oil samples.

"To make a crankcase oil control program work, there are two requirements. Examination of oil samples must be completed by the laboratory as promptly as possible. Recommendations for corrective action must also be passed to the maintenance supervisors promptly. This also calls for close cooperation by both groups.

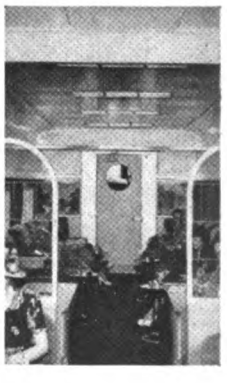
"Diesel lubricating oil is not only the life blood of the engine, but the mirror that all times reflects the condition of the engine and its associated equipment. It requires a trained observer to interpret the messages that lube-oil samples can give. I'd recommend that you visitors call at our test department. The apparatus and methods that you'll find there have made that department a sort of 'watchdog' for our diesel fleet."

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Now, all Met-L-Wood Baggage Car Doors are fully warranted to perform satisfactorily for five years. They will not warp, twist or swell. They require no through bolts, screws or rivets. Tough and strong, they withstand more abuse than other type doors in all kinds of weather.

Met-L-Wood Doors are proven doors. For more than a decade Met-L-Wood Baggage Car Doors have been in use and continue to prove their superiority. For complete details on how Met-L-Wood Doors can do a better job for you, *write for Bulletin 520* today.



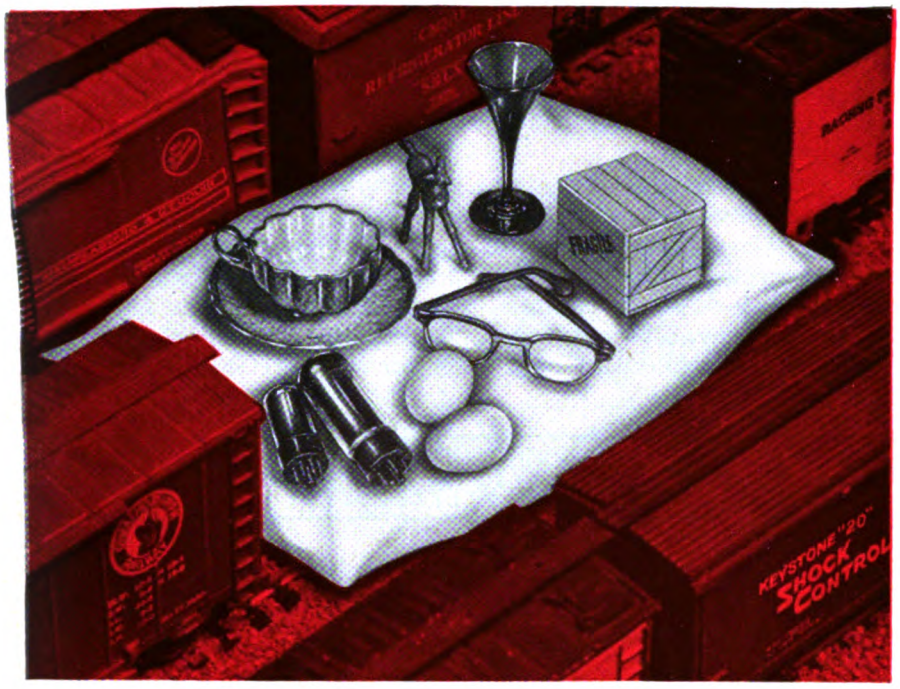
Met-L-Wood Doors are also available for other interior and exterior uses. They offer complete waterproof edge and surface seal to add years of useful door life. There are types and sizes available to meet every road requirement.

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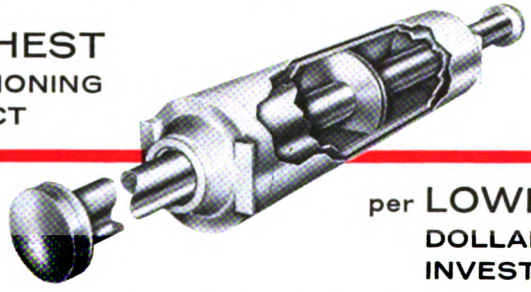
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CHICAGO 38, ILLINOIS

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HIGHEST
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Over 400 new freight cars equipped with Keystone SHOCK CONTROL will start rolling next month. These cars added to over 3000 already in use are positive proof of the effectiveness of Keystone's SHOCK CONTROL System.

Railroads, shippers and receivers alike have found through experience that freight cars equipped with Keystone SHOCK CONTROL deliver their goods in first class condition—eliminate the major problem of freight loss and damage claims.

Here's an investment that will pay for itself and provide you a bonus of customer good will.

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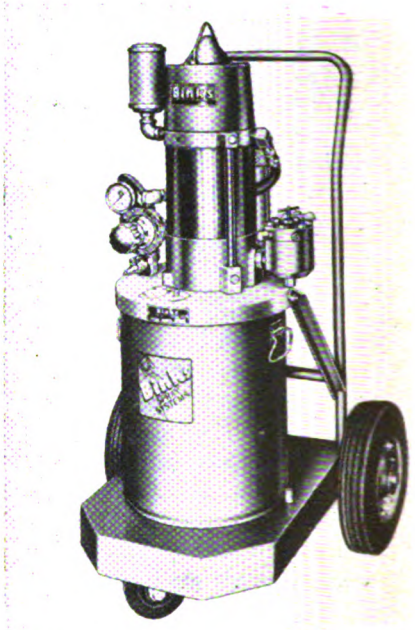
In Canada: International Equipment Company Limited
6205 Cote de Liesse Road, Montreal 9, Quebec

What's New

(Continued from page 18)

temperatures. A two-step burner measures air/fuel ratio. No auxiliary compressed air is needed for fuel atomizing. The generator is available in five models rated from 500 to 5,000 lb steam per hr. Clayton Mfg. Co.

For more information, circle 9-24 on card following page 72.



Spray Painting Unit

Two versions of the Titan 40 to 1 ratio airless spray painting unit are available—a 5/10 gal unit mounted on a roll-around cart, and a 55-gal model for pumping material direct from original containers—each of which can handle two spray guns. The units feature a 6-in. diameter air motor with a 5-in. pump stroke. Maximum material delivery is 1.4 gpm, with continuous delivery recommended at 1.0 gpm. The pumps are especially designed to handle heavy viscosity materials, but can handle medium or light viscosity materials where relatively low input air pressures prevail. Binks Manufacturing Co

For more information, circle 9-25 on card following page 72.

Self-Filling Blaster

The Impco Auto-Fill Blaster permits continuous sandblasting by one or two men without shut-down for refill of the pressure sandblasting section. It is a high-production device capable of handling two ½-in. nozzles and was developed for sandblasting freight cars. The first unit is being put into service by the Wabash. Dry sand, drawn by a vacuum from a storage hopper, recharges the upper compartment of the three-compartment, twin-outlet pressure vessel automatically. The center section is depressured to receive sand from the upper section without stopping the actual sandblasting. The lower section, under pressure at all times, is filled at intervals by auto-

atically pressurizing the intermediate ction to the same pressure, causing sand flow down into it. The lower section is uipped with twin abrasive controls and in sandblast lines, each with its own dead-an control. One or both lines may be ed. Imagineered Products Co.

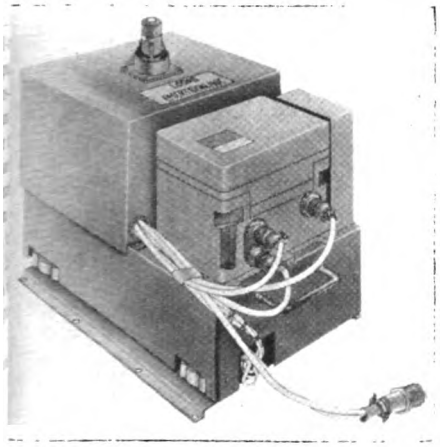
For more information, circle 9-26 on card llowing page 72.



Air Dryers

The internal design of the General Air Dryer has been improved to remove up to 0% of the water vapor mechanically, decreasing the workload on the dryer's desiccant bed which is slowly dissolved in the process. In the dryer the air is "scrubbed" three times—by the mechanical separator, by a misting system, and by the chemical desiccant. The dryer can be used in yards to prevent frozen air lines and in locomotive air-brake systems. General Welding & Fabricating Co.

For more information, circle 9-27 on card following page 72.



Locomotive Recorder

Diesels on a large Eastern road are being equipped with a locomotive data recording system (Lodar) which can record speed, train brake pressure, throttle position, acceleration, and other locomotive functions as detected by special remote sensors. The system, basically a magnetic tape recorder, is said will help solve major operational problems and possibly reduce insurance rates. Tests and evaluation of the system, which weighs 30 lb, are said to have established a degree of accuracy of better than ±2%. Emertron, Inc.

For more information, circle 9-28 on card following page 72.



"We developed this cleaner —for a friend of ours"

"This is our new inertial separator which we call the DynaVane. It handles large volumes of air at high velocities with a minimum of pressure drop.

"One of our railroad friends came to us and requested just such an air cleaner — and one that wouldn't require any maintenance. He wanted to keep snow from entering the engine compartments of his locomotives. The DynaVane was so successful in not only keeping snow out, but also dirt, that it has been adopted by railroads for year 'round service.

"If you've got a problem, let us help you solve it. The chances are good that we'll find you another DynaVane.

"That's how most of the products in our line were developed. People in our engineering department found an answer to other people's problems. That's why over 85% of diesel locomotives in America today are equipped with one or more Farr products."

R. S. Farr

PRESIDENT, FARR COMPANY, LOS ANGELES
MANUFACTURERS OF FILTRATION EQUIPMENT FOR THE RAILROAD INDUSTRY

Synthetic Degreaser

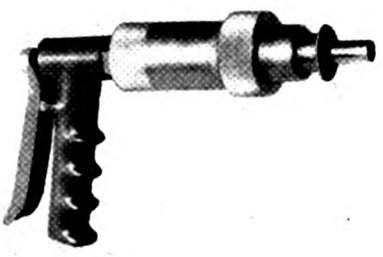
FO-300, a combination of surface active agents, solvents, emulsifiers, couplers, and inhibitors, was formulated for the removal of road film, grease, oil, tar, and asphalt deposits on diesel locomotives. It is miscible with petroleum solvents in any dilution ratio, and stable emulsions are formed with one part of FO-300 to 20 and over parts of water. Its KB (Kauri-Butanol) value is over 105. The degreaser is said to be nontoxic and safe for use on all metals and painted surfaces. Fine Organics, Inc.

For more information, circle 9-29 on card following page 72.

Structural Materials

Steel-backed urethane sheets, Armstrong PS-671 and PS-672, are said to have the structural and mechanical advantages of steel and can be fabricated directly into chutes, hoppers, tanks, and other equipment requiring abrasion protection. The sheets, which supplement use of Armstrong PO-663 fabric-backed urethane sheets and rolled goods, have an 80 Shore Duormeter hardness, 4,000 psi tensile strength, and an elongation of approximately 500% at break. The urethane facing is bonded to the steel backing as the urethane is secured. PS-671 has a 16-gage (.0625 in.) backing and the PS-672 a 10-gage (.140 in.) backing, both of low-carbon, hot-rolled black iron. Armstrong Cork Co.

For more information, circle 9-30 on card following page 72.



Cleaning Tool

The Pulsair gun converts available compressed air into a succession of powerful air "bullets," which, it is said, rapidly loosen and remove dirt and caked materials from hoppers, chutes, and other hard-to-clean areas. Steam, water, detergents, or other chemicals may be introduced through the gun for use in especially difficult jobs. Maintenance programming with the guns, it is said, can reduce cleaning time by 85% or more. Haines Gauge Co.

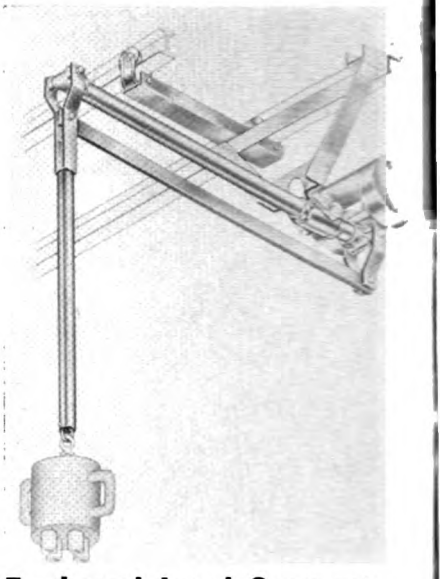
For more information, circle 9-31 on card following page 72.

Cleaning Compounds

Rustax, an alkaline rust remover, is said to be particularly effective in removing rust, light scale, water scale and most metallic oxides from steel tanks and circulating or agitating equipment. It is also recommended for the removal of oil, grease, chips, shop soils, paints, resins, adhesives, and carbonized organic deposits. No special ap... equipment is needed, and the compou... emits no corrosive or toxic fumes.

Agisolv 14, a solvent cleaner designed f... use in agitator washers and tanks, is said t... remove the heaviest carbonaceous soil... from engines, and all types of grease a... foreign matter from machinery and equip... ment. No mixing or diluting is require... The solvent, which can be used cold, is sa... to work rapidly. Branson Equipment Co...

For more information, circle 9-32 on ca... following page 72.



Tool and Load Support

The Centech Triaxial Balancer can be sus... pended from overhead, bracketed off a wa... or inverted and mounted on a pedestal base. There are no springs or cables, and no lubri... cation is required. The Model B-100 has a tool or load-handling capacity of up to 7... lb, and standard counterweights are avai... able for balancing loads of from 15 to 10... lb. The counterweight position is adjustable to compensate for weight of hose and cables. The support is applicable in such operations as spot welding, riveting, drilling, grinding, and jig and fixture positioning. Centech Corp.

For more information, circle 9-33 on ca... following page 72.

Insulation Panels

Following a TTMA Rating Test, a 40-f... REA Leasing Corp. trailer insulated with Insulfoam polyurethane foam panels ob... tained a certified 4,400 Btu/hr rating. This is said to be 27% better than other foamed-in-place reefers previously tested. The panels are available in 4-ft widths, with foam thicknesses from 2 to 6 in., and in lengths tailored to dimensions. Liners, bonded to the foam during manufacture, may be any flat or corrugated rigid materi... such as plywood, hardboard, fiber glass, aluminum, stainless steel, or galvanized steel. The prefabricated panels can be installed with tools usually available. Insulfoam, Inc.

For more information, circle 9-34 on card following page 72.

DO YOU HAVE A BOMB IN YOUR SHOP?



Replace it with a new EAGLE Oily Waste Can

Listed and Labeled by Underwriters Laboratories, Inc. and Factory Mutual for safe disposal of flammable wastes



Eagle Oily Waste Cans will prevent fires resulting from solvent and oily waste, rags, swabs, shavings and other materials subject to spontaneous combustion. Cans come in two styles—with and without foot lever. Large one-piece lid enables user to dispose of bulky waste matter safely, easily. Triangular-shaped for stability . . . strong steel construction. Come in 6, 10, 14 and 21 gal. sizes. Highest quality. Attractive pricing.

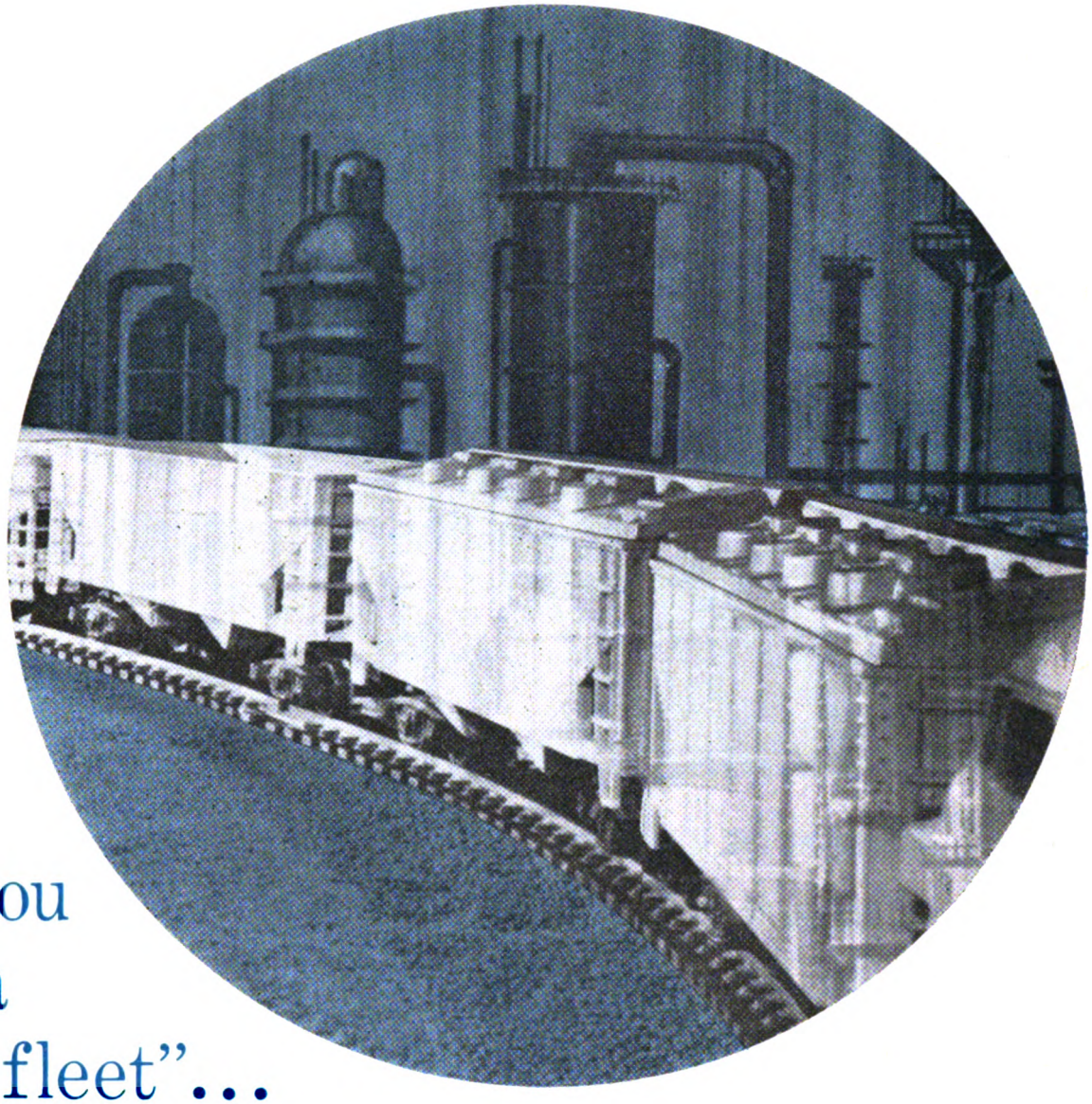
Order EAGLE Oily Waste Cans from Your Distributor
Eagle Cans are sold throughout U.S. and Canada

EAGLE MANUFACTURING COMPANY
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Write for new EAGLE Safety Can Catalog!



OILERS, OIL & GASOLINE CONTAINERS, SAFETY CANS



Will you have a ghost fleet"...

because you use low cost paint for chemically corrosive service?

Chemicals and abrasives can chew up ordinary paints in less than a year. Yet, you obviously cannot pull scarce covered and open hopper, wood chip and Airslide® cars out of high revenue service for recoating that often.

Result: costly cars are "eaten alive". The pennies you save on low cost paint come home to haunt you.

Using Freight Liner 510 solves this very serious problem. It costs slightly more initially, but Freight Liner 510 does not need recoating for several years when properly applied . . . even under severest corrosion or abrasive conditions.

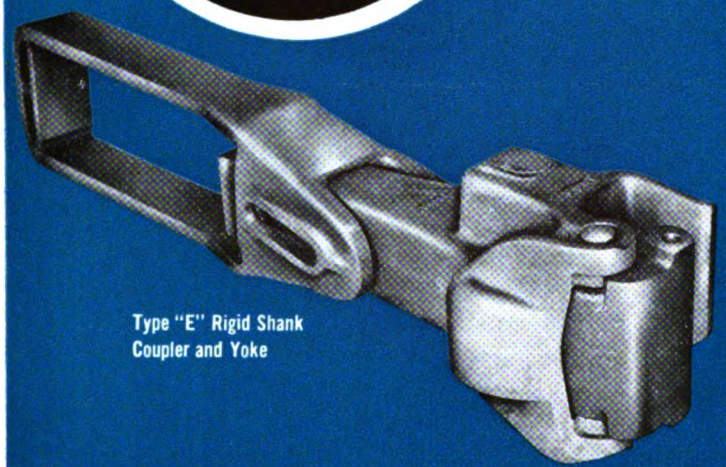
Talk to us soon about actual case histories of Freight Liner 510-coated cars that have been hauling salt, sulphur, salt cake, soda ash, potash, sand and other car-crippling commodities. Find out exactly how you save money by specifying the best corrosion resistant coating money can buy . . . Freight Liner 510.

Freight Liner 510

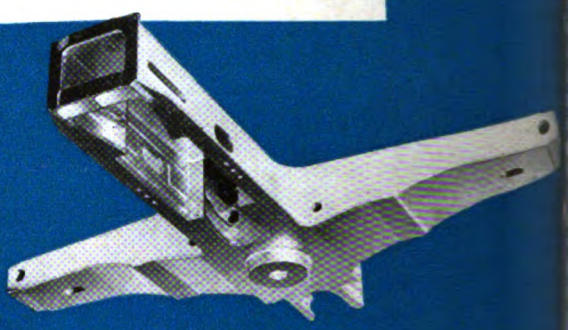
ADM CHEMICALS

ARCHER DANIELS MIDLAND COMPANY 700 INVESTORS BUILDING MINNEAPOLIS 40, MINNESOTA

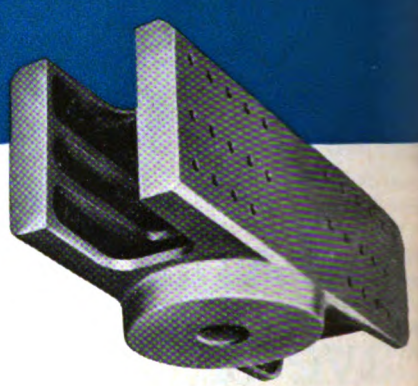
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Type "E" Rigid Shank
Coupler and Yoke

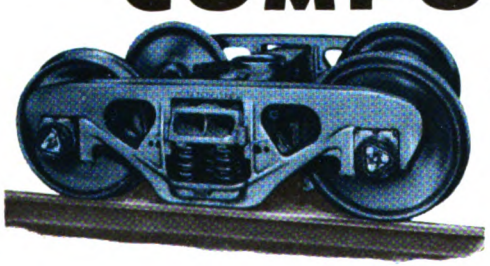


One Piece
Underframe End

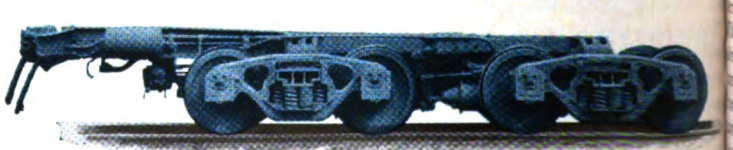


Bolster Center Filler with
Integral Center Plate

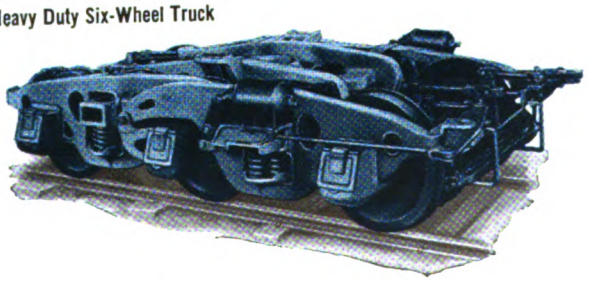
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eport

(Continued from page 8)

con diodes are applied by one road as lacements for the reverse current relays l contactors on Baldwin and Fairbanks-rse locomotives whenever the original ıtactors need repair. Two Westinghouse) amp, 200 PRV (peak reverse voltage) con diodes in parallel are used. They ve worked well except for some recent ubles on locomotives having 125-volt ıtrol systems where improper application overheating may have produced the diffi-ty. Silicon diodes have also been tested EMD and Alco units. Three diodes in rallel, 50 amp, 100 PVR were recom-nded by the manufacturer. When volt-e surges caused failures, protective diodes 200 PVR and, finally, 300 PVR rating re applied around the battery field and ernator field on EMD locomotives. Five 4D E-7 locomotives being rewired have en equipped with two sets each of 200 V diodes as reverse current contactors. sting of Alco units has been difficult be-use of voltage spikes.

The EMD static load regulator on the P-30, taking variable voltage, variable equency, three-phase power from the al-rnator, produces controlled variable volt-e direct current for battery field excita-on of the main generator. There are no sses in load-regulator resistors, and main-nance of carbon brushes and commutator the regulator is eliminated. The genera-r load curve is made to match variable comotive conditions more closely. A few ıoving parts remain—the vane motor and small variable rheostat. These are worked ır below their ratings.

The static auxiliary generator regulator as been marketed for several years and is erforming satisfactorily. Fairbanks-Morse as now added current control to this regu-ıtor. Two other companies expect to have .atic regulators shortly.

On order are two different types of static black box" devices to replace the auxiliary enerator, its regulator, reverse current re-ay, battery contactor and 0.05 ohm resistor. These are to take variable-voltage, variable-requency, three-phase power from the al-ernator and produce 10 kw at 74 volts d-c. There are to be no moving parts except pos-ibly a fan. One type will involve the "mag-mp" principle with large copper and iron omponents and only a few small electronic omponents. The other uses the silicon con-rolled rectifier (SCR) principle, involving ess copper and iron but with larger, more xpensive electronic components.

Two thermo-electric water coolers in ervice on the Illinois Central since last August, use the thermocouple effect in which passage of an electric current across a junction of two different metals generates or absorbs heat, depending on the direction of current flow. There have been some trou-bles with the Janette rotary inverter used to change battery current to 110 volt, 60-cycle input to cooler. Vapor prototype static in-verter now replaces the Janette type.

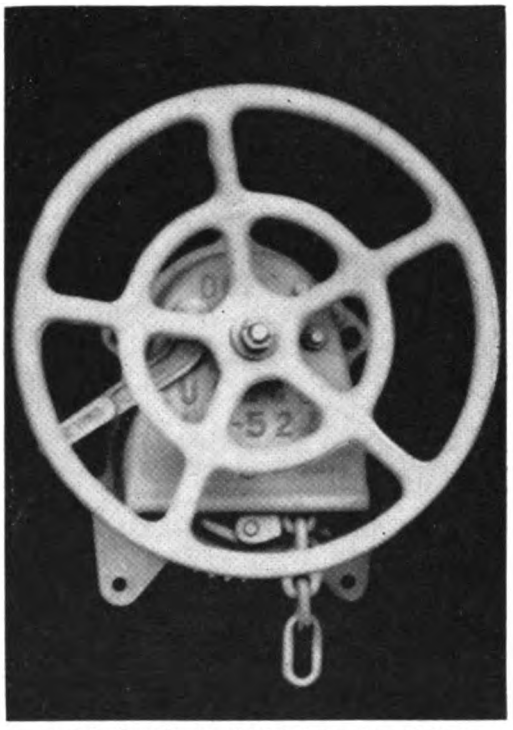
Transistorized power packs installed on diesel-electric locomotives in conjunction with radio communication systems have failed, possibly because of voltage spikes. Methods are being studied to provide protection. Transistorized cab-signal amplifiers which were failing because of voltage spikes originating in the decoding transformer have been protected by the addition of filtering circuits.

A review of the Electrical Manual formerly maintained by the Electrical Section of the Engineering and Mechanical Divisions has led the committee to recommend that the Mechanical Division form a Committee on Welding, relieving the Committee on Electrical Equipment of that responsibility. Some parts of Section 12 of the Electrical Manual, Locomotive Facilities and Procedures, might be included in the Mechanical Division Manual. Electrical Manual, Section 14, Safety, should be replaced with a reference to Circulars 17-D and 17-E of the Bureau of Explosives which supersede the Section as it now appears.

The Committee also recommended that an AAR standard and receptacle arrangement and control system be developed for push-pull trains. The Pullman-Standard arrangement used on the Chicago & North Western trains (RL&C, Dec. 1959, p. 22) and the Budd arrangement used on the Milwaukee trains (RL&C, July 1961, p. 40) are incompatible, meaning that any interchange of equipment would require costly modifications. The Committee also recommends that consideration should also be given to the automatic coupling of train-lines, now used on some electric m-u commuter cars.

The Committee reports progress in the

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development of an improved portable psychometer, known as "Hygrophil" to determine refrigeration capacity of air-conditioning systems. Overhaul of such systems would be simplified, and trouble shooting could be expedited if rapid and accurate determination of air volume and wet bulb temperature could be obtained. Comparison of information before and after overhaul would show not only the amount of improvement but could indicate something about the defects involved.

Considerable work is in progress to eliminate the main generator commutator and brushes. Small brushless d-c generators have been in service for some time. Delivery has been made of ten 10-kw and five 25-kw axle generators having no brushes, commutators, slip rings, pole changers, reverse current relays and the regulators which have no moving parts. Some are already in service on Illinois Central coaches.

Reefer Systems Need Improvement

Mechanical refrigeration units for refrigerator cars and trailers using diesel-engine prime movers are currently being challenged by stored, expendable refrigerants such as liquid oxygen and liquid nitrogen. Another development which might supplant the diesel engine and reciprocating compressor is the gas turbine with a centrifugal compressor. With improvements in materials and equipment, however, the present diesel-powered compression refrigeration and heating system will undoubtedly continue in use for some time, according to R. F. Mck chief engineer, Pacific Fruit Express.

Mr. McKee told last month's meeti the Society of Automotive Engineers i Angeles that the shortcomings of the pr refrigeration systems do not actually i their diesel engines. While the diesel en itself is basically a simple, rugged devi quiring only air and fuel to operate. usually surrounded by a myriad of ponents and auxiliaries which have a m higher failure rate than the basic engine future developments will provide a sy in which all parts have the same degre reliability and long life as the diesel e itself, the transportation industry will to look no further. The fact that this so and that there is no real assurance be attained is leading to research in methods of providing refrigeration." McKee said.

Growth of the frozen-food industry produced the trend toward mechanical frigeration because the salt-and-ice sy in conventional bunker refrigerator could not provide low enough temperat Many mechanical and semi-mechanical tems were tried but failed to satisfy three essential requirements of depend ity, economy, and endurance.

The diesel-powered units which finally evolved come closest to achie these qualities, providing also consider flexibility because electric current from diesel-electric generating sets or rev cycle operation with the direct-drive can provide heating when this type of protection for lading is needed.

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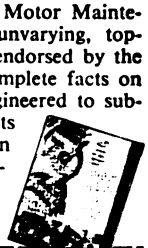
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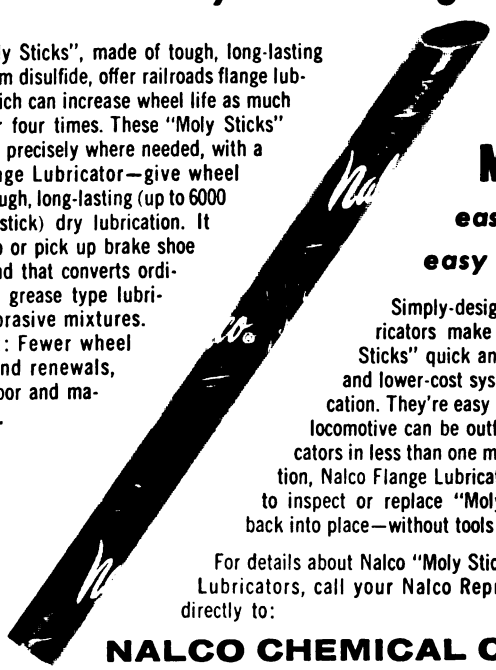
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easy to install, easy to maintain

Simply-designed Nalco Flange Lubricators make application of "Moly Sticks" quick and easy—a far simpler and lower-cost system than "wet" lubrication. They're easy to install, too: a diesel locomotive can be outfitted with eight lubricators in less than one man-day. After installation, Nalco Flange Lubricators can be swung out to inspect or replace "Moly Sticks" and swung back into place—without tools or special equipment.

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ire development both of rail and ıy refrigeration systems will depend ability of manufacturers to increase lability of components to equal the engine. If this is not done, the increas- ıts of operation will require adoption r forms of refrigeration, Mr. McKee ded.

chine Tool" defined

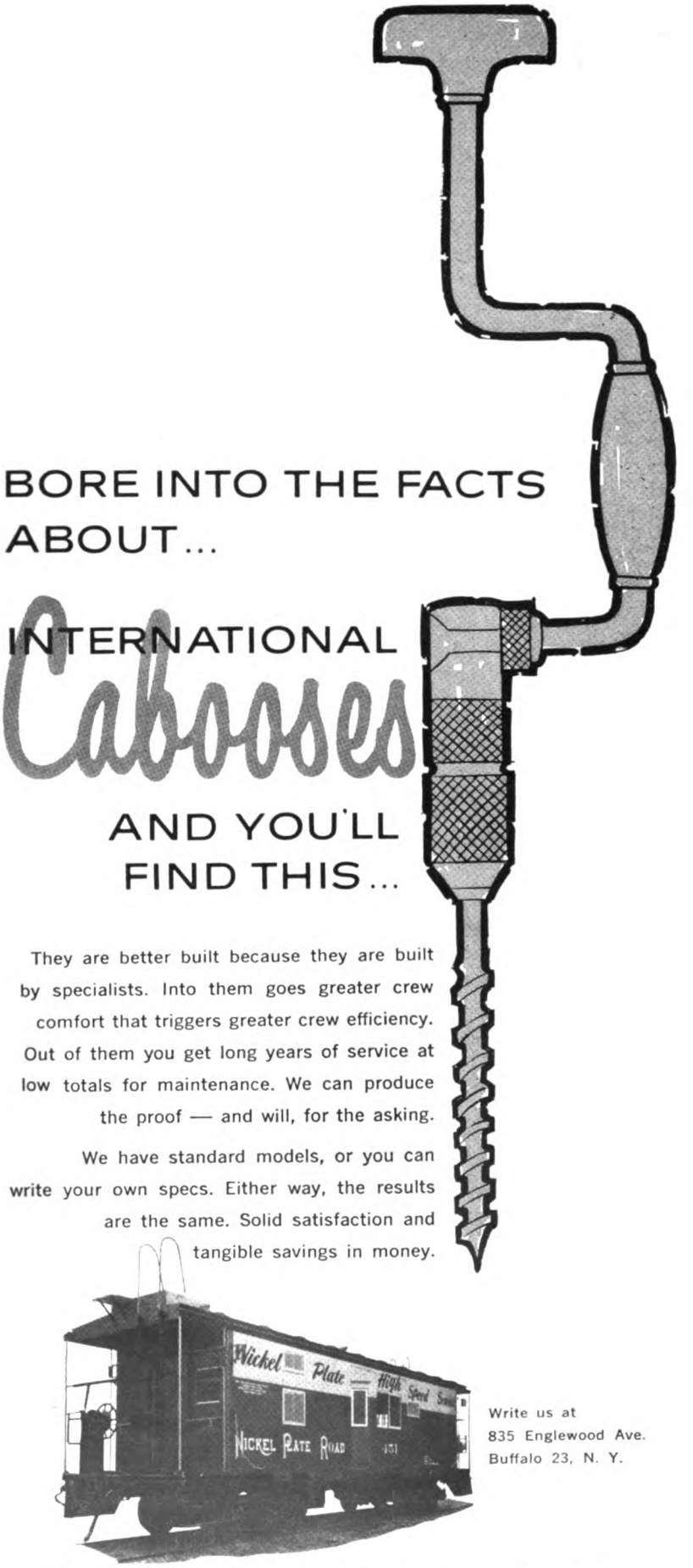
ision of the definition of the term ine tool" has been approved by the ıal Machine Tool Builders' Associa- take into account many of the newer ds of forming and shaping metals. ew definition reads: "A machine tool ower-driven machine, not portable by used to shape or form metal by cut- mpact, pressure, electrical techniques, a combination of these processes." technological advances in electro- cal forming, explosive forming, Laser Maser cutting, high energy impact ng, electrical spark erosion, magnetic ng and other new methods are outside ope of the previous definition which passed primarily cutting and forming of machine tools.

en-Top Loads t Responsibility

portance of providing uniform, safe economical methods for loading open- ars has been emphasized by the AAR nittee on Loading Rules. Hazards in- d in such movements require that the ating carrier and shipper inspect ship- s after they are loaded to see that they roperly and safely secured in accord- with the standards. For loads not spe- lly covered by the Loading Rules, the ating carrier and shipper must confer appropriate blocking and bracing, dering distance, multiple-track lines, s, curves, and train speeds involved in oute to destination. A new paragraph r General Rule 1 states that loading on -top cars having either integral or spe- tie-down arrangements is not covered AR Loading Rules insofar as secure- details are concerned.

new method of loading lumber on flat without using side stakes has been de- ed to reduce both loading and unload- costs for shippers and receivers. It is ribed in Section 5, Fig 6-A.

ne high-tension-band table in General 15 of Section 1 has been revised to in- e additional sizes and to show the min- n breaking strength instead of load ngth. Samples of high-tension-banding wire materials are being tested at the R Research Center to determine whether ot the new minimum breaking strength joint strength tables can be revised to ct actual commerical minimum per- nance. A new paragraph has been ed which states that shippers should be to show that a banding or wire product l for securing open-top loads meets AAR ifications. Lading strap anchor devices ch will not accommodate full widths of ds should not be used for securing such ds.

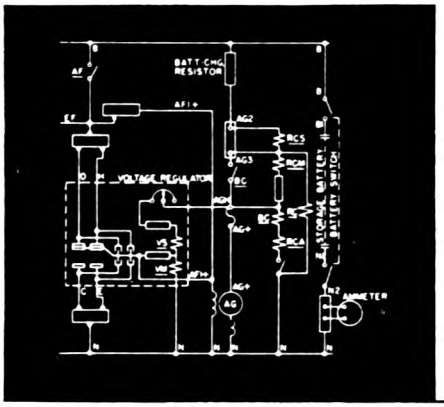


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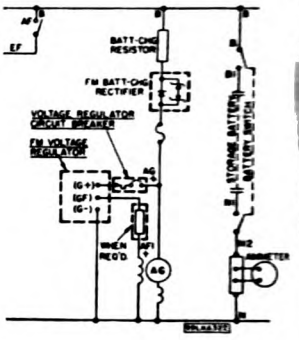
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Eliminate components containing moving parts subject to wear, burning and misadjustment.



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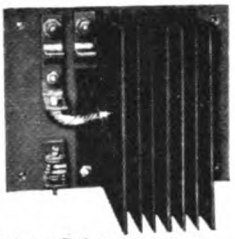
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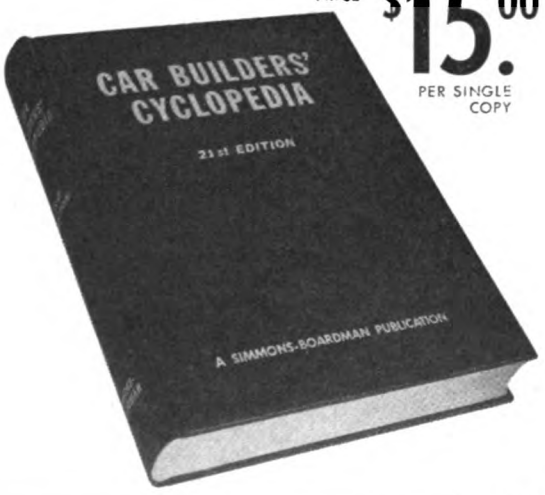
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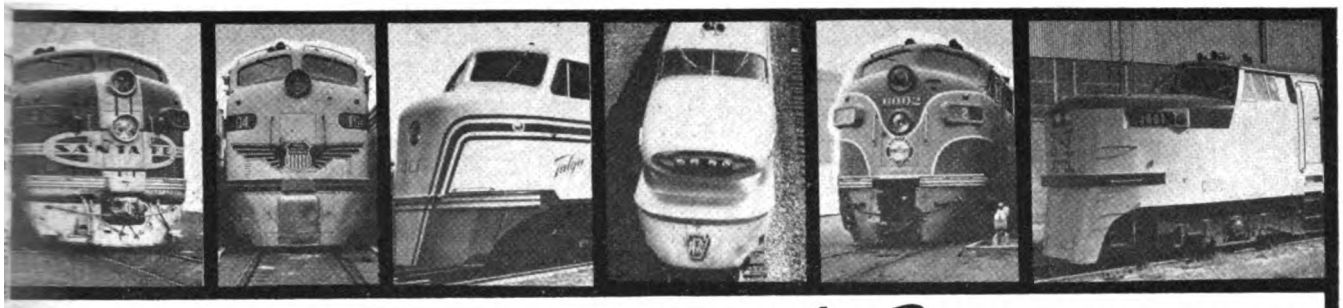
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›motive Orders

.F, MOBILE & OHIO.—*Electric Motive:* 20 ·hp diesels. Cost, $3,500,000. Units will re- 27 now on roster.

:KEL PLATE.—*Electro-Motive:* 10 2,250-hp -electric locomotives. November delivery.

ght-Car Orders

NADIAN NATIONAL.—*National Steel Car:* 150, n, 89-ft flat cars, with tri-level racks. For ›er delivery. *Greenville Steel Car:* 50 70-ton, -cu ft covered hopper cars. Cars which are u ft larger than CN cars now in use, are for ›n Grand Trunk Western lines in U.S. No- ›er and December deliveries anticipated.

NADIAN PACIFIC.—*National Steel Car:* 100 tri-level auto-rack flat cars. Approx. cost, ,0,000.

IESAPEAKE & OHIO.—*Pullman-Standard:* 100 ›-cu ft covered hopper cars; 100 70-ton long- :l cushion underframe box cars. *ACF:* 100 ›n long-travel cushion underframe box cars.

IICAGO & NORTH WESTERN.—*Pullman-Stand-* 50 90-ton, 4,000-cu-ft capacity center dump red hopper cars. Delivered. *General Ameri-* 30 70-ton covered hopper cars. Cost, $450,000. October delivery.

HICAGO SOUTH SHORE & SOUTH BEND.—*General erican:* 2 Airslide covered hoppers.

ENNESSEE & WYOMING.—*Greenville Steel Car:* 0-ton, 2,300-cu ft hopper cars equipped with Gregor roll-a-way roofs for rock salt service; 40-ft box cars. All cars being rebuilt from ting equipment. Deliveries start this month.

ULF, MOBILE & OHIO.—*Pullman-Standard:* 250 cars—200 50-ton, 50 70-ton. Delivery started :00.

EW YORK CENTRAL.—*General American:* 50 70- insulated box cars. Approx. cost, $920,000. December delivery.

ICKEL PLATE.—*General American:* 20 70-ton ilated steel box cars with cushion underframe load dividers. For December delivery.

ROCK ISLAND.—*General American:* 5 Dia-Flo covered hoppers. Cost, approx. $70,000. Deliveries scheduled for October.

SOUTHERN PACIFIC.—*ACF:* 100 4,000-cu ft Center Flow aluminum covered hopper cars. Cost, approx. $2,000,000.

UNION TANK CAR.—*Company shops:* 82 tank cars—10 30,000-gal capacity; 15 20,000-gal; 1 16,000-gal; 29 12,000-gal; 21 10,000-gal, and 6 8,000-gal.

Notes and Inquiries

Chicago & North Western 1962 car repair program, which covers more than 5,000 units, includes 2,800 box cars which will be upgraded to Class A condition and 1,800 gondolas which will be equipped with steel flooring. Program calls for rebuilding or repair of 2,036 more cars than originally planned for 1962.

Gulf, Mobile & Ohio freight-car program will involve expenditure of approximately $5,150,000 for purchase of new cars and $700,000 for upgrading existing equipment.

Norfolk & Western $10,000,000 equipment acquisition program reportedly includes 26 2,250-hp GP-30 diesel-electric locomotives from EMD; 200 70-ton, 50-ft cushion underframe box cars from Pullman-Standard, and 50 100-ton aluminum covered hopper cars from Magor.

Southern plans to acquire new equipment valued at $23,625,000, according to an ICC order authorizing the issuance of $9,450,000 of equipment-trust certificates as the first installment of Philadelphia Plan financing. Acquisition program reportedly includes 60 2,250-hp GP-30 locomotives from EMD; 50 auto-parts box cars from Pullman-Standard; 200 aluminum covered hopper cars from Magor; 48 bulkhead chain-equipped flat cars from Thrall; 30 cushion underframe flat cars from Pullman-Standard, and 100 covered hopper cars.

Union Pacific will add 1,650 new roller-bearing equipped cars to its freight-car fleet. No breakdown of types of cars made by road, which expects deliveries during the remainder of 1962 and early 1963.



P. Scarola
Motor Coils



T. C. Ballou
ACF

ACF INDUSTRIES, AMERICAN CAR & FOUNDRY DIV.—*Thomas G. Ballou,* manager of railway equipment sales, appointed St. Louis district sales manager, succeeding *Harold M. Aitkenhead,* now field sales manager. Cleveland district sales office moved to Huntington, W. Va. *James P. Gardiner,* product manager for railway car parts, named district sales representative at Huntington.

■

MOTOR COILS MANUFACTURING CO.—*Philip Scarola* appointed vice-president, sales.

■

ELECTRO-MOTIVE DIVISION, GENERAL MOTORS CORP.—*Warren A. Fox,* manager of sales engineering at La Grange, Ill., appointed district manager of railroad activities, Eastern Region, with New York headquarters.

■

HUCK MANUFACTURING CO.—*Allen N. Juengel* appointed sales representative, Midwest Region, with headquarters at St. Louis, Mo. *Stephen K. Henkel* named to Seattle, Wash., sales staff.

■

MAGNAFLUX CORP.—Magnaflux offering monthly Workshop-Seminars covering ultrasonic testing. The five-day program, first of a new series beginning September 24, gives supervisors of quality, inspectors, operators, and those responsible for training the opportunity to learn theory, procedures, and techniques used in pulse and resonance principles of ultrasound. For further information, contact Robert C. Eichin, director of training, at 7300 W. Lawrence ave., Chicago 21.

upply Trade

MSTED INDUSTRIES INC. — *E. C. akeman* named Cleveland district sales anager for American Steel Foundries' ansportation Equipment division, succeeding *James J. Higgins,* who died July 4.

■

ESTINGHOUSE AIR BRAKE CO. — *hn B. Dolph* appointed representative, ir Brake Division, New York. *Stanley F. ayer,* service engineer, appointed district gineer, New York.

■

INNESOTA MINING & MANUFACURING CO.—*Russell P. Stimely* appointed sales manager, all trades, at Seattle, Wash., succeeding *Willis C. Rech, Jr.,* now sales manager, industrial and automotive trades, at St. Louis, Mo.

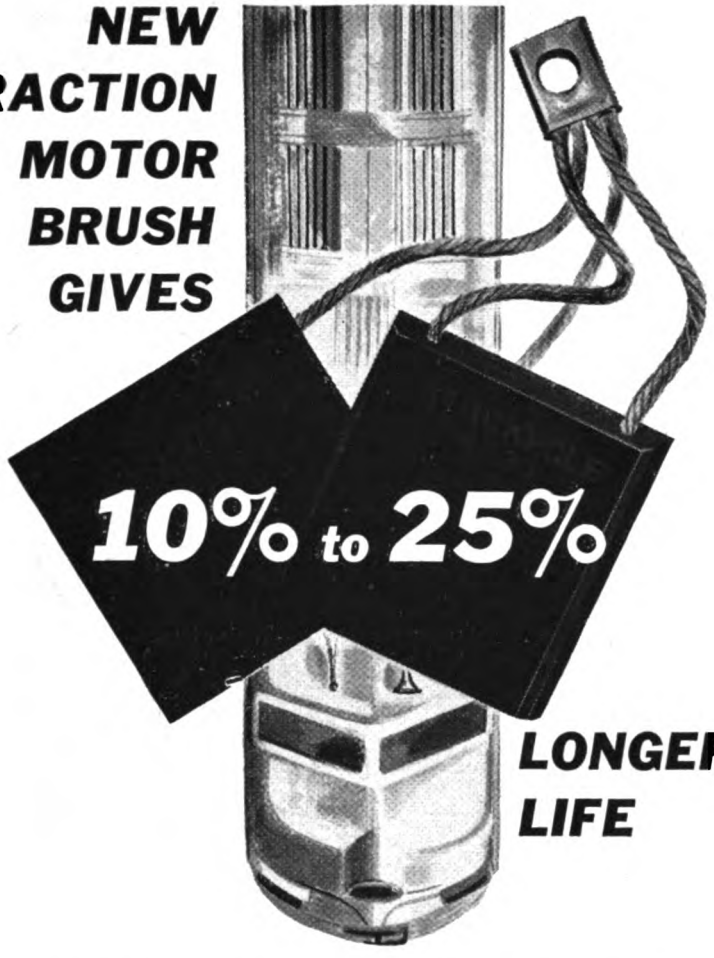
■

STRATOFLEX, INC.—*A. J. Bowie,* sales engineer at Seattle, Wash., appointed sales manager, Western Division, with headquarters in Hawthorne, Calif. *Lyle S. Freeman,* sales engineer at Pittsburgh, Pa., transferred to Denver, Colo., as sales engineer.

■

GUSTIN-BACON BRAKE CO.—Company, a wholly owned subsidiary of Gustin-Bacon Manufacturing Co., has acquired certain patents, trademarks, and other assets of Maxibrake, Inc., of Pasadena, Calif.

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LONGER LIFE

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It's remarkable when this same brush outperforms other brushes in *every* type of service!

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Throughout the tests improvements in brush life using AC-35 averaged 10% to 25% above even the best "restricted duty" brushes previously used . . . and with equally gratifying reductions in commutator maintenance.

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STACKPOLE CARBON CO. St. Marys, Penna.

Personal Mention

Long Island.—*Jamaica, N.Y.:* J. BRANNA appointed assistant chief mechanical officer. Formerly master mechanic, Morris Park shops. E. P. DECECK appointed assistant to chief mechanical officer. H. J. KALLMAN appointed master mechanic; R. W. WALLENDORF assistant master mechanic, and A. C. PRIE assistant general foreman in charge of multiple-unit inspection, Dunton Inspection Shop. *Richmond Hill, N.Y.* (Morris Park shops):C. P. SOFFEL named superintendent of shops. H. V. TOZER, assistant general foreman, appointed general foreman, locomotive shop, and C. A. GRZIMALA general foreman, car shop.

Pennsylvania.—*Philadelphia:* D. G. GOERING appointed assistant engineer of motive power. *Altoona, Pa.:* L. A. DIXON and N. K. MEHAFFIE appointed assistant engineers of tests. S. B. GOODMAN appointed foreman air-brake shop.

Trade Publications

(To obtain copies of publications, circle corresponding numbers on card following page 72.)

48. INSULATION TESTING. Manual S-74 describes "latest" techniques and equipment for testing electrical insulation of components, cables, assemblies, and completed systems, as well as testing samples of insulating material. Associated Research Inc.

49. URETHANE FOAM. Bulletin D-30 gives detailed information on various properties of three types of Hetrofoam fire retardant urethane foam systems for transportation and other fields. Hooker Chemical Corp.

50. HOT BOX DETECTIVE. "Servosafe Hot Box Detective" describes various components of the Servosafe Hot Box Detect system and shows various types of installations in operation on railroads throughout the country. Servo Corp. of America.

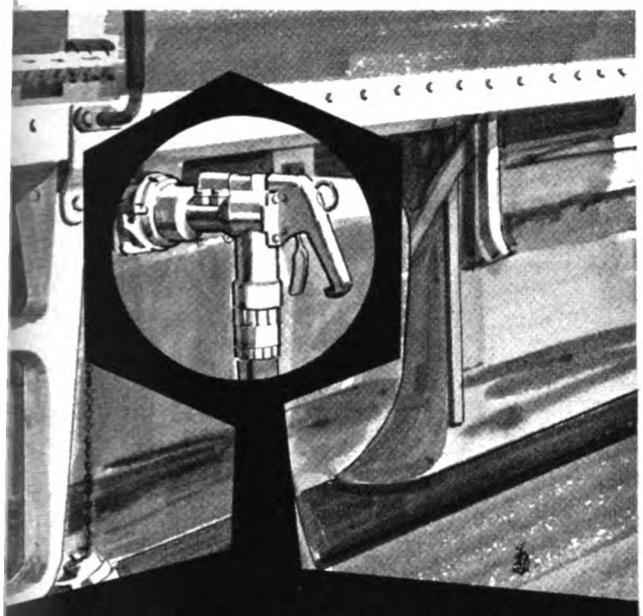
51. DISC BRAKES. 8-page booklet describes Budd disc brakes, their advantages and operating costs. Budd Co.

52. AIRLESS SPRAY EQUIPMENT. Catalog I-3505-A includes data on airless spray equipment, including an air-operated agitator for 5-gal airless unit, a Cuno paint filter and pulsation chamber for large airless pumps, and other new and improved items. DeVilbiss Co.

53. ADHESIVES. Chart form bulletin B-12 identifies each Bostik adhesive, sealant and coating formulation which has been classified by U.S. government agencies. Describes each formulation and function it can perform. United Shoe Machinery Corp.

54. PAINT SPRAY UNIT. Form 2815 describes new electric "airless" paint spray unit designed for use without air compressor and without heat. Balcrank, Inc.

Product Reference 69A



here's why more Class I railroads have converted 100% to Buckeye automatic diesel refueling than to any other system!

The Buckeye System cuts refueling costs. Automatic shut-off eliminates fuel loss, spillage, and contamination. Saves time and labor. Saves money, too!

But, most important, the Buckeye Automatic Diesel Refueling System uses just two basic component parts:



Patented



***THE ADAPTER.** Installs in minutes with no locomotive modification. No cutting, drilling, or welding. No holes in your fuel tanks or skirts. No need to take locomotive to your shop to install. And, best of all, no moving parts on the locomotive that might lead to costly down time for repairs.

THE NOZZLE. A masterpiece of simplicity proved in 15 years of use. Handles all flow requirements. Shuts off automatically at a predetermined level.

***Installs in just 15 minutes with simple hand tools.**

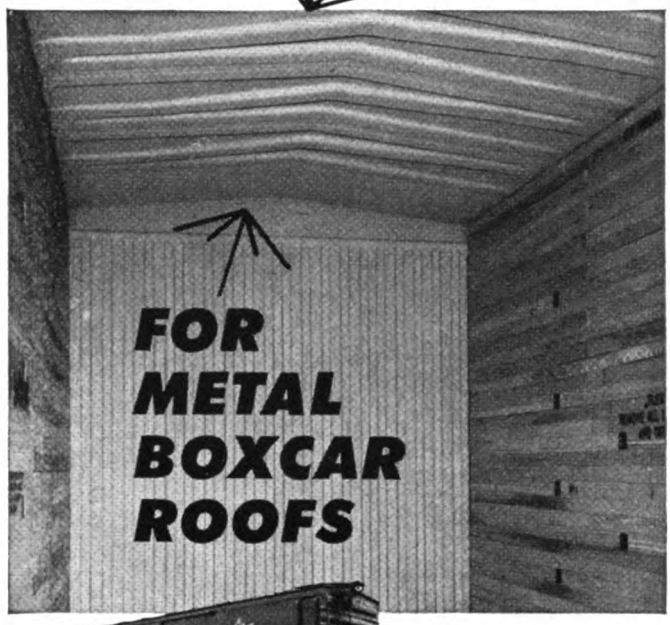
Like to see the Buckeye System demonstrated on your locomotives? Write:

ENTERPRISE RAILWAY EQUIPMENT COMPANY
8754 South Dobson Avenue, Chicago 19, Illinois
Representatives for Buckeye railroad products in the U.S.A.

Buckeye BUCKEYE IRON & BRASS WORKS • DAYTON 1, OHIO

Product Reference 69B

Frost's *Insulcote!*





UNION PACIFIC IS ONE OF MANY USERS OF FROST'S INSULCOTE

Here's the practical, economical way to prevent sweat damage to lading...

● Now it is possible to apply a quick, economical coating to metal boxcar roofs that will assure a permanently dry surface.

Insulcote, an emulsion-type plastic coating for metal boxcar roofs, actually *absorbs* moisture preventing condensation that can result in sweat damage.

Insulcote bonds to galvanized metal surfaces under any conditions . . . without preliminary acid treatment of surface. It is not affected by mineral solvents and fumes.

Another big advantage of Insulcote is ease of application. One man can undercoat the roof of a 40-foot boxcar in less than 15 minutes. Insulcote can be applied with heavy-duty spray gun equipment. It is safe and clean . . . and presents no fire hazard.

Available in 5-gallon steel pails and 55-gallon open-head steel drums. Write for free booklet.

other FROST RAILWAY SPECIALTIES

NO-RUST Car Journal Compound **VERNIX** Floor Hardener
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Frost **PAINT & OIL CORPORATION**
1209 N.E. TYLER
MINNEAPOLIS 13, MINNESOTA

AAF AMER-kleen air filters do a better job at lower cost on engine intakes and carbodies



REPLACEABLE GLASS FIBER FILTERS PROVE SUPERIORITY IN RAILROAD SERVICE... NOW INSTALLED ON 29 RAILROADS

On-the-job operation in locomotives has clearly demonstrated these three major competitive benefits of AMER-kleen air filters:

1. *LOWER INITIAL COST.* The cost of metal panel filters is at least 70% more than for AMER-kleen retaining frames.
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3. *LOWER LOCOMOTIVE MAINTENANCE COSTS.* AMER-kleen allows far less dirt (about half that of metal filters) to get to — and into — your equipment.

ONLY AAF MAKES ALL KINDS. AAF makes all three types of filters used in engine intake and carbody service — metal, oil bath and AMER-kleen. We *recommend* AMER-kleen, and we think you'll *demand* AMER-kleen when you know all the facts. Write for a free copy of AMER-kleen Bulletin 125. Address: J. K. Sparrow, Engine & Compressor Department, American Air Filter Company, Inc., 348 Central Avenue, Louisville, Kentucky.

AAF American Air Filter

BETTER AIR IS OUR BUSINESS

Letters to Editor

Railroad Research

TO THE EDITOR:

I have read the July issue of Railw Locomotives and Cars and have fo many articles of considerable interes this issue.

For example, your editorial on page regarding our record for the month of A of over 1,000,000 car-miles per hot b set out was, in my opinion, a very gu example of reporting information in interesting and factual manner.

The article on page 47 concerning y collaboration with the Locomotive Ma nance Officers Association in handlin new feature covering problems in conn tion with the maintenance of diesel lo motives should prove to be of considera help to the railroads as well as to employees so involved.

I did find, however, one point in yo editorial on page 21 entitled "Better C munication" which I feel is somewhat co fusing. The sentence in question reads follows: "With the relatively meager bu gets for AAR and railroad research pr grams—about $10 millions per year— M Keller said 'we cannot tolerate overlapp or duplication if the fullest benefit is to obtained.' "

It so happens that on page 24 of same issue you did quote from Mr. Kelle address his exact language concerning th point which was as follows: "We estima that the entire research program of AAR and railroads combined is appro mately $10 million per year, of which AAR spends less than 10%. In a researc program as small as this, there cannot b tolerated any overlapping or duplication.

While those of us who are closely co nected with the research budget of the AA Research Department have all the facts a hand, I am very much afraid that th who would only read your editorial page 21 in a somewhat hurried manne might get the wrong impression to th effect that a very substantial portion the $10 million figure quoted had be allocated the AAR Research Departme

Fred Peronto
Executive Vice-Chairman
AAR Mechanical Divisio

In our July issue we were right the seco time and we appreciate the opportunity "set the record straight" and eliminate misunderstanding about the AAR's resea expenditures. Mr. Keller was emphasiz that AAR and railroad research progra are relatively small and the need to av duplication is great. We know that th economic position of the railroad indus is such that it can not afford any dupl tion. Almost 30 years ago Dean A. Potter of Purdue University, in advocati centralized railroad research direction, sa "Any industry that does not take advantag of new knowledge and is not constan searching for new developments is bou to lose in its competition for sales an services." We believe railroad research important; that every dollar must count.

Editor

ew Books

STS—A TOOL FOR RAILROAD NAGEMENT. By Ernest C. Poole, (re- d manager, Bureau of Transportation earch, Southern Pacific Co.), consulting sportation engineer. The railroad officer wants to make effective use of cost data loing a better job of railroading has to w how the cost figures are compiled and ssure himself that all pertinent factors included. The book was not written pri- ily for the specialist in cost-finding; it s to be useful to the alert railroader, tever his departmental specialty, aiming naking generally known throughout the stry some information which, so far, not been available to cost-finding spe- ists. Included are studies of motive- er and car-operating costs, repair costs, other information of interest to me- nical departments. This has been com- d primarily for its application to rail- d rate making. The book aims to set forth ie of the practical problems that con- nt the cost finder, indicating how he must ust his calculations to assure that they ne close to reflecting the actual condi- ns in a given situation.

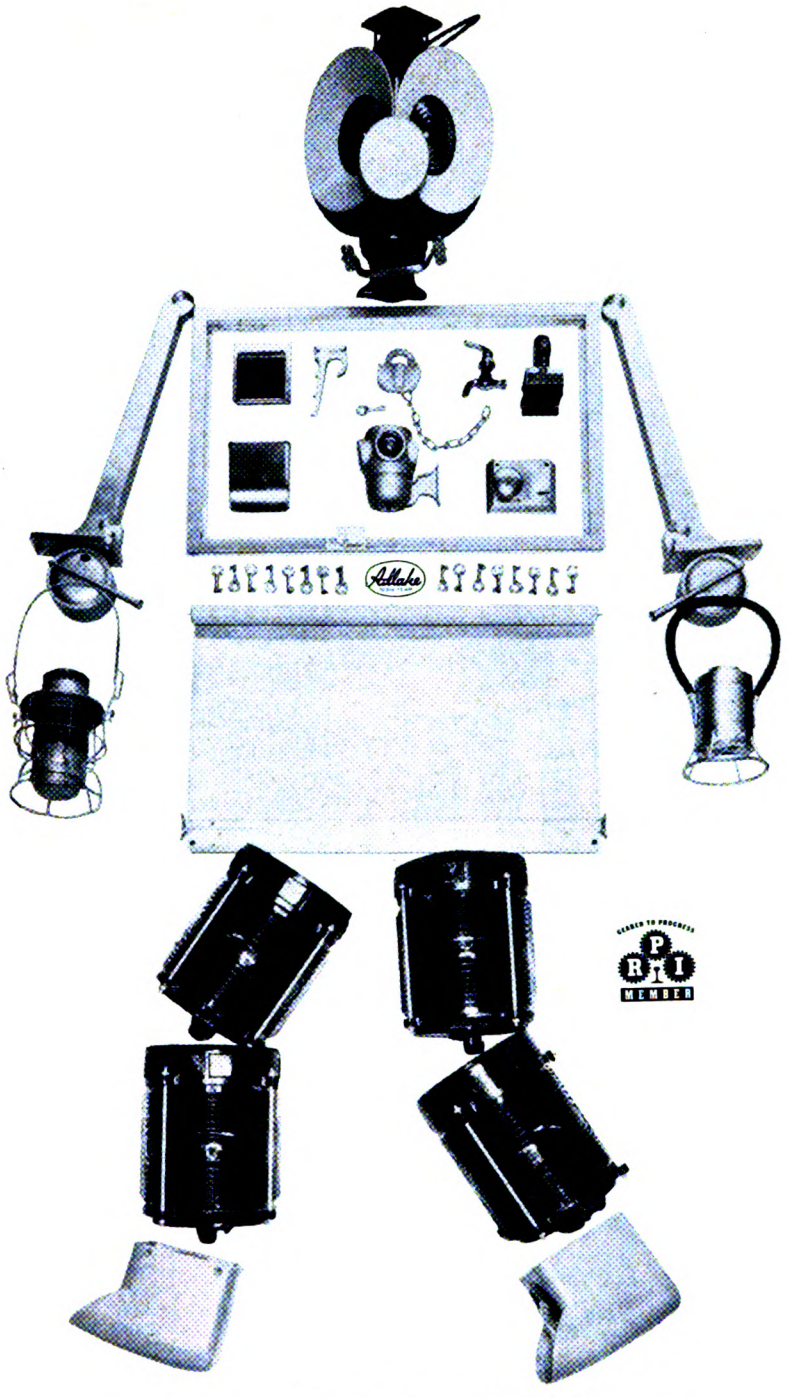
Simmons-Boardman Publishing Corpora- n, 30 Church st., New York 7. Price, $6.

GINE INSTALLATION MANUAL. nual, published by the Internal Combus- n Engine Institute, is for use by design gineers concerned with applications of in- nal combustion engines. The 152-page ume covers ratings, selection, application d installation of gas, gasoline and diesel gines from small air-cooled models up ough 1,000 hp and larger. Typical of ier areas of engine selection and installa- n treated and illustrated are: Cooling, Air ake Systems, Couplings and Mountings, haust Systems, Governors and Speed ntrols, and Safety and Automatic Con- ls.

Internal Combustion Institute, 201 N. ells st., Chicago 6. Price, $5.

JEL INJECTION AND CONTROLS OR INTERNAL COMBUSTION EN- NES. By Paul G. Burman, chief hy- aulic engineer, and Frank De Luca, chief el injection engineer, American Bosch ma Corp. This book is an endeavor to the need for a comprehensive treatise on e fuel injection system. While primary nsideration is given to fuel injection for esel engines, applications to gasoline and s-turbine engines are included. Some pio- er developments in solid and air injection e presented, followed by descriptions of rious injection systems, design of major mponents, analyses and requirements of ray and injection characteristics for vari- s types of engines, fuel filtration and sup- y systems, pump calibration and serv- ng, and test methods and instrumentation ique to the industry. Although some the- y is given, the greatest emphasis is on ap- cation. Simple calculations or graphical ethods are used, and descriptive examples e given where possible.

Simmons-Boardman Publishing Corp., 30 hurch st., New York 7. Price, $7.50.

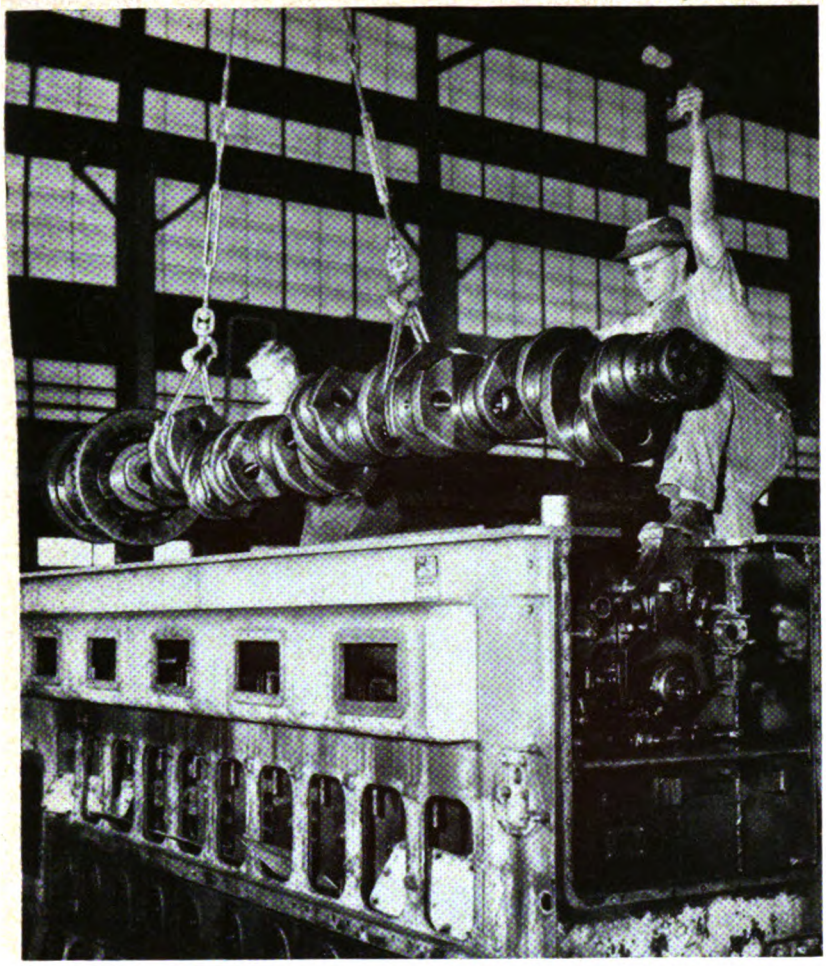


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Product Reference 72A



NEW ENGINE WARRANTY ON OLD O-P ENGINES!

Fairbanks-Morse Opposed-Piston Engine Renewal Service upgrades old O-P engines with the latest in design and materials. Gives them new performance efficiency. Lowers maintenance costs.

Full FM Renewal includes . . . dismantling and cleaning . . . precision inspection . . . parts replaced when necessary . . . reassembly by experts . . . full operational test . . . *all with a New Engine Warranty!*

Bring your engines up-to-date. Write Fairbanks, Morse & Co.; Railroad Renewal Parts Sales; Beloit, Wisconsin

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Color styling and designing available on a consultation basis.

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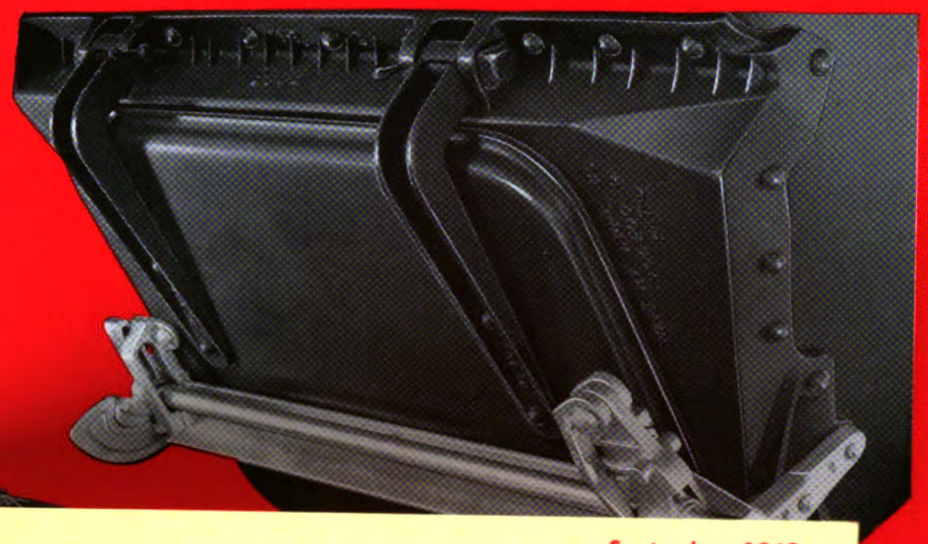
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21433 Mound Road • Warren, Michigan
"Engineered Lettering Systems"

DEMP NOCK

Product Reference 72B

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American Air Filter Company, Inc.
American Sab Company
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Circle the numbers indicating the information you want.

September 1962

WHAT'S NEW — Send more information on products beginning on Page 8:

9-1 9-2 9-3 9-4 9-5 9-6 9-7 9-8 9-9 9-10 9-11 9-12 9-13
9-14 9-15 9-16 9-17 9-18 9-19 9-20 9-21 9-22 9-23 9-24 9-25 9-26
9-27 9-28 9-29 9-30 9-31 9-32 9-33 9-34

TRADE PUBLICATIONS — Send free literature listed on page 42:

48 49 50 51 52 53 54

ADVERTISEMENTS — Send more information on products advertised on pages:

2	3	4	6-7	9	11-12	14-15	16-17	19	20-21
22	24	31	33	35	37	39	40-41	42	45
47	48	51	53	55	57	58	59	60	61
62	63	64A	64B	65	66	67	68	69A	69B
70	71	72A	72B	73	74				

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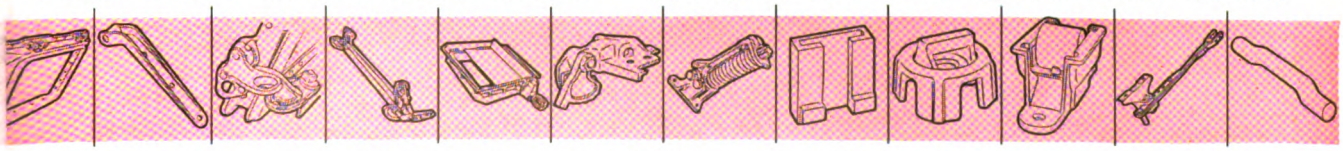
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makes single and double HOPPER DOOR LOCKS

PLUS MANY OTHER APPLIANCES

...h is expertly cast, carefully finished and pre-assembled so as to require only a minimum of time, effort and a few rivets for installation. □ Wine's new *single* hopper *cam* lock (photo to right) offers a number of unique advantages . . . assembly consists of fewer parts, cam action lock means easier operation, doors are held equally tight on both sides. □ The Wine adjustable *double* lock has long proven its complete reliability and is in use on thousands of cars of nearly every line. □ For the best in hopper door locks, frames, hinges and other appliances — see below — get in touch with your Wine sales representative or write us for illustrated literature.



e appliances include: Hopper Frames, Hinges and Door Locks • Discharge Gates • Drop End Locks • Drop End Balancers • Drop Bottom Balancers • Brake Balancers • Single Double Roller Side Bearings • Lading Band Anchors, Fixed and Swivel • Vibrator Brackets • Interlock Pinless Hinges • Ladders • Grab Irons and Hand-Holds • Miscellaneous Car Castings • You can also depend on Wine for prompt delivery of spare parts.

1912-1962
Fifty years of leadership in railway appliances and service to the car building industry and railroads.

WINE RAILWAY APPLIANCES

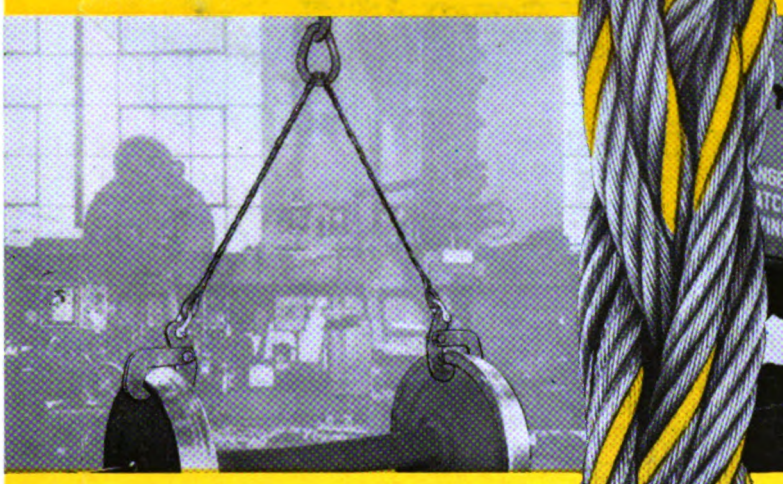
THE WINE RAILWAY APPLIANCE CO.
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PIGGYBACK . . . Yellow Strand slings add ease and speed to operations.



IN THE YARD . . . versatile Yellow Strand slings adapt to many needs.



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Where can YELLOW STRAND slings and sling experts help you lift profits and cut costs?

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Revised edition of the Riggers Handbook... 192 pages of the latest data on Yellow Strand slings, their applications, sling fittings, and rigging data. Get your copy now from your B&B distributor or our nearest branch office.



Whatever the task, whatever the load, there's a Yellow Strand braided safety sling that can do the job best, easiest, safest. Yellow Strand sling experts are ready to serve you, to help provide exactly the right kind of sling for your specific job...and add extra versatility to the sling where needed. Make your sling investment a profitable one; call in the Yellow Strand sling expert for help in lifting profits.

Yellow Strand®

BRAIDED SAFETY SLINGS

BRODERICK & BASCOM ROPE CO.

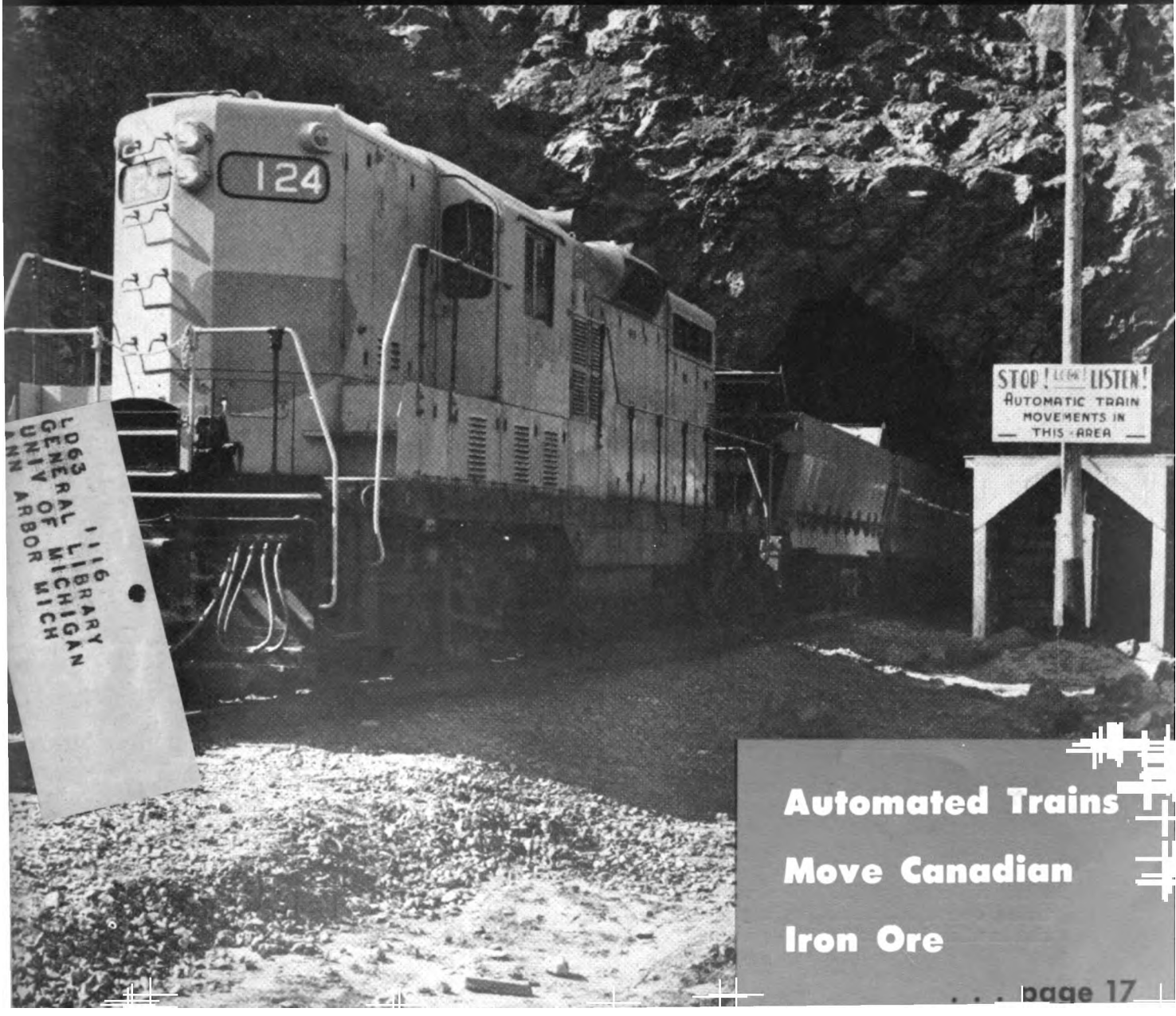
ST. LOUIS • PEORIA • HOUSTON • SEATTLE

At Coordinated Meetings . . . . p. 26

How SP Diesel-Hydraulics Are Doing ▪ Complying With the Power Brake Law ▪ 10,000,000 Miles per Hot Box Set-Off ▪ New Officers of Associations

THE UNIVERSITY OF MICHIGAN
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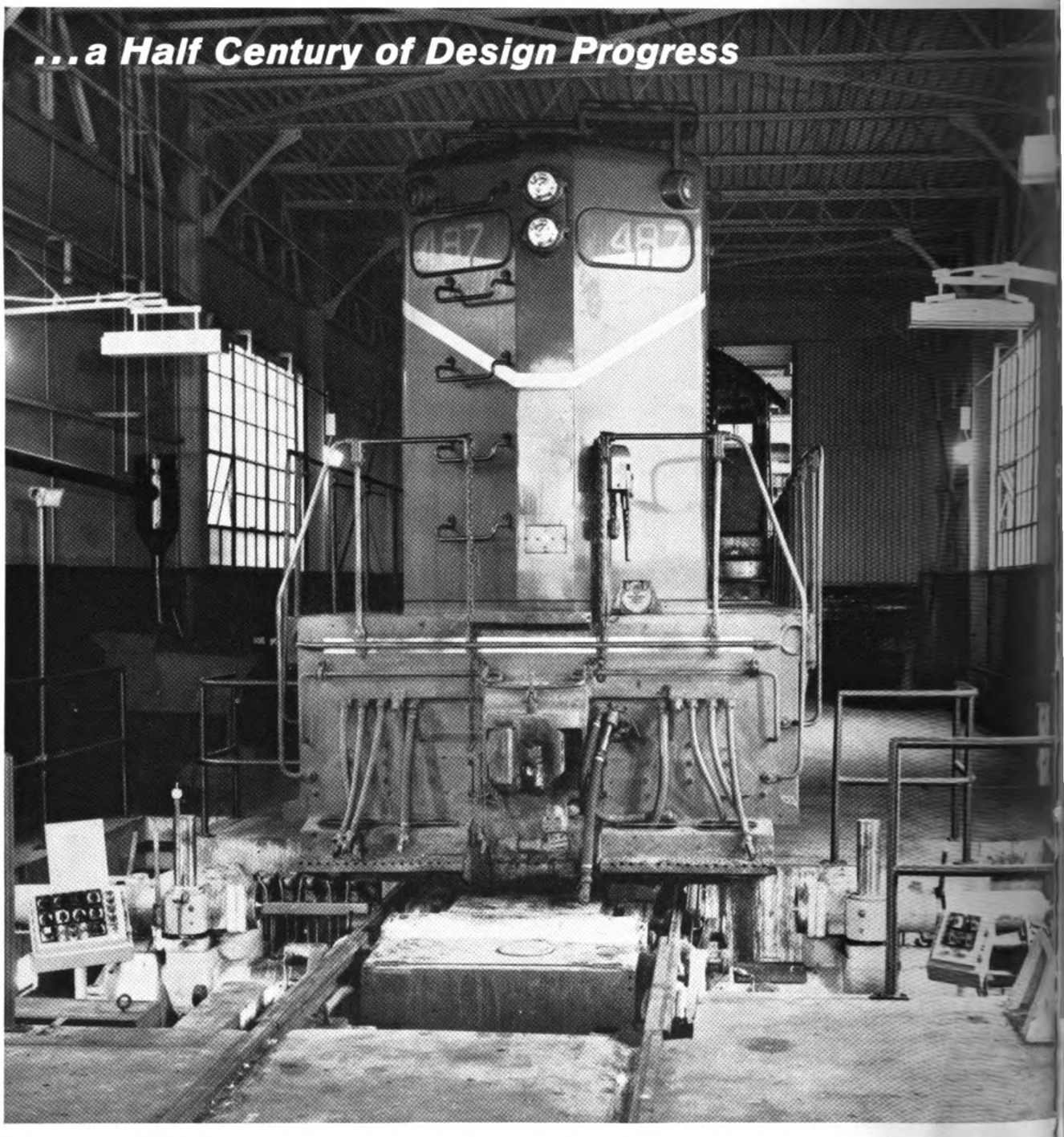
RAILWAY
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A SIMMONS-BOARDMAN TIME-SAVER PUBLICATION
October 1962



LO63
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ANN ARBOR MICH

Automated Trains Move Canadian Iron Ore

. . . page 17



The wheels will stay on this locomotive while they're trued —on the Standard Wheel Truing Machine

Locomotives are run under their own power right up to the Standard Wheel Truing Machine. There, without removal of wheels from the locomotive, wheels are quickly precision milled and equipment goes back to service.

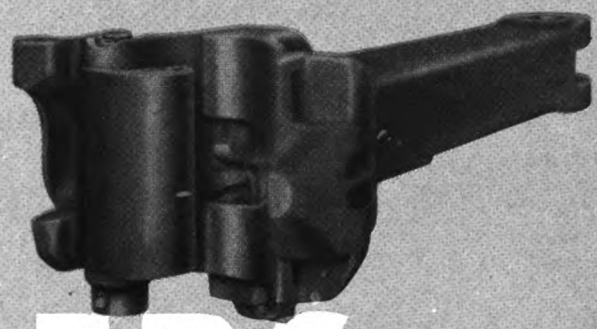
As many as 8 pair of wheels can be trued in 8 hours. Usually two cuts completely recondition a wheel. Eliminated entirely are dropping wheels, transporting wheels to the shop, turning on a conventional lathe, the movement of wheels back to the equipment and wheel remounting. Substantial time is saved in the truing operation, permitting a proportionate reduction in wheel inventories.

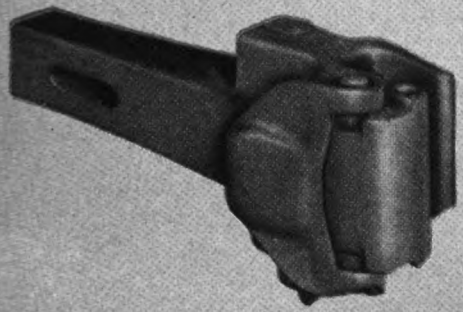
One railroad's analysis showed savings through use of the Standard Wheel Truing Machine to be more than $350.00 a day. To find out how you can return equipment to the road faster and at similar savings ask our representative. Or write Wheel Truing, Standard Railway Equipment Division, 4527 Columbia Ave., Hammond, Indiana.

STANDARD RAILWAY EQUIPMENT
division of STANRAY CORPORATION
Hammond, Indiana • New York • Chicago

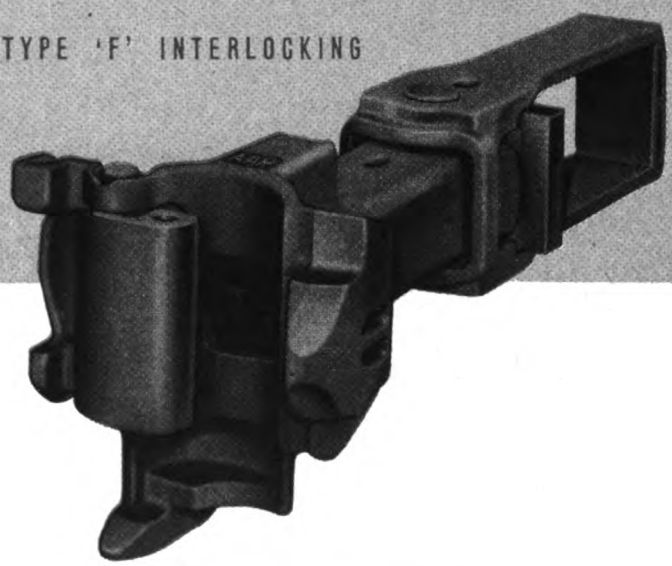
BUCKEYE *dependability*
***..TIME-PROVEN* quality!**

A.A.R. Standard COUPLERS

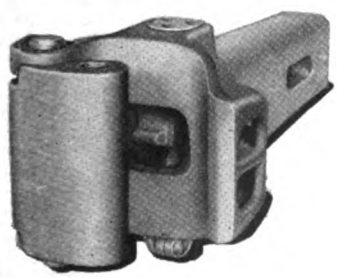




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- TYPE 'E' RIGID OR SWIVEL SHANK
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FOR INDUSTRIAL
AND EXPORT CARS



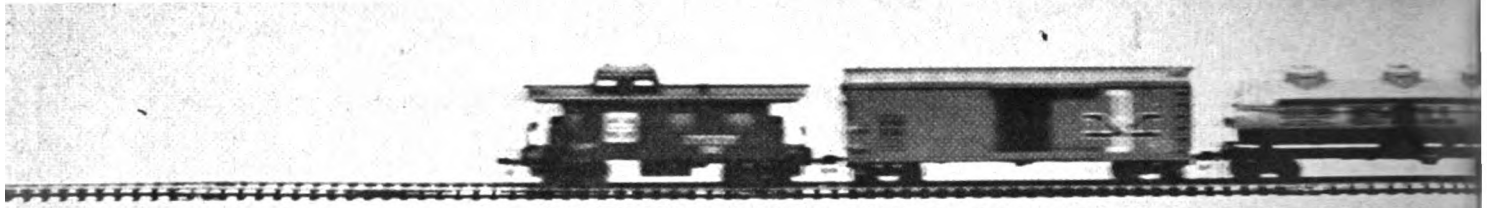
TYPE "E" JUNIOR

The Buckeye Steel Castings Co.

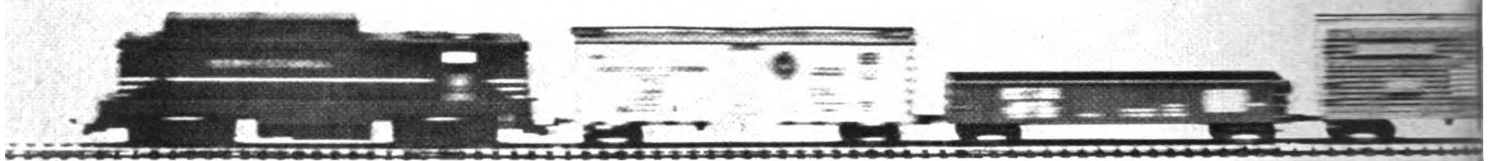
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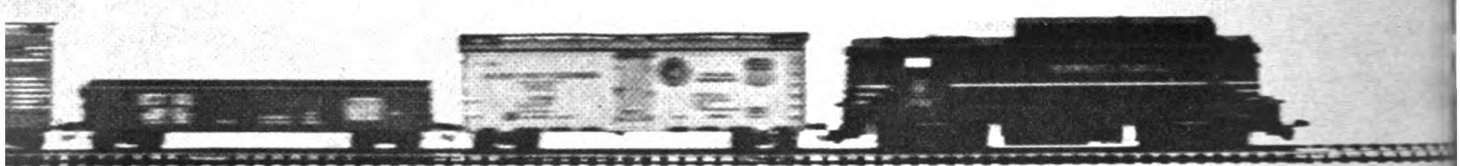
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IT RUNS AND RUNS AND RUNS AND RUNS...



MONTH AFTER MONTH AFTER MONTH AFTER MONTH...



YEAR AFTER YEAR AFTER YEAR AFTER YEAR...



IN SNOW AND RAIN, AND SLEET AND HAIL, AND DUST AND GRIT...



SAFELY AND SURELY THE JOURNALS ROLL—WITH WIKIT® JOURNAL LUBRICATORS

WIKIT is economical to use because of its low initial cost, top performance record and easy, inexpensive renovation.

WIKIT's center wick design provides shortest and most direct oil flow to journal. LOOP-TITE® jacket has interlocking loop pile with high tensile strength. Over-all design assures rapid, multifeed wicking throughout lubricator.

WIKIT's ABSORBenized® treatment provides greatest wicking and absorbency—a special process featured in famous Callaway bath towels.

WIKIT #10 retains over 5 pints of oil after saturation and draining 3 hours. Cores are best-quality nitrile foam—resistant to oil, moisture, heat, compression set. Strong nylon tape secures nonferrous pull handle. Insert either end first, either side up.

WIKIT is the quality lubricator—AAR conditionally approved.



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Railway Products Sales, La Grange, Georgia. Representatives in New York, Philadelphia, Cleveland, Chicago, St. Paul, San Francisco, San Antonio, Louisville, Montreal

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CARS

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REPORT FOR OCTOBER

Freight Car Truck Panel Set By ASME RR Division

A panel discussion on freight-car truck design will feature the program for one of the three Railroad Division sessions being planned during the annual winter meeting of the American Society of Mechanical Engineers to be held at the Statler Hilton Hotel, New York, November 25-30. On the panel will be L. S. McGregor, chief of motive power and car equipment, Canadian National; William Van Der Sluys, associate director-research, Pullman-Standard; C. A. Naffziger, director, Freight Loss and Damage Prevention Section, Freight Claim Division, AAR, and Carl E. Tack, vice-president, American Steel Foundries. W. M. Keller, vice-president, Research Department, AAR, will be the moderator. After a formal presentation by each panel member, questions will be invited from the floor. The program for the three Railroad Division sessions follows.

WEDNESDAY, NOVEMBER 28

2:30 p.m.

Progress in Railway Mechanical Engineering 1961-1962.

New Concepts in Freight-Car Brake Rigging—G. M. Cabble, senior staff engineer, Westinghouse Air Brake Co.

Outer Pedestal Leg of Narrow Pedestal Side Frame—Carl E. Tack, vice-president, American Steel Foundries.

THURSDAY, NOVEMBER 29

9:30 a.m.

Panel discussion on Freight-Car Truck Design.

2:30 p.m.

Use of Canadian Crudes in Locomotive Diesel Engines—H. U. Wisniowski, senior research officer, National Research Council of Canada; W. H. Cyr, chief mechanical engineer, Canadian National; C. W. Parker, chief mechanical engineer, Canadian Pacific.

High Horsepower Diesel-Hydraulic Locomotives in Heavy Duty Freight Service—J. J. Schmidt, assistant director, research, Denver & Rio Grande Western.

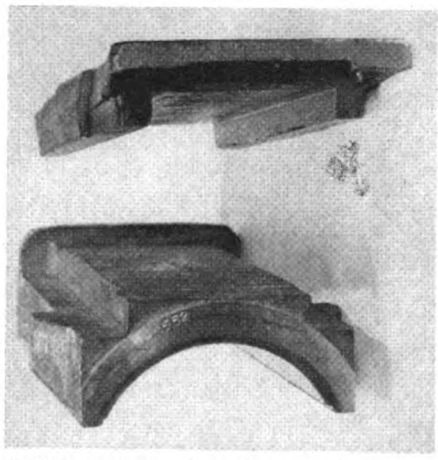
Some Observations on the Adhesion Characteristics of Electric and Diesel-Electric Locomotives—D. R. Malleod, manager, Locomotive Product Planning and Marketing Research, and D. R. Meier, manager, Railroad Locomotive Engineering, General Electric.

'Hi-Hat' Bearing Gets Interchange Authorization

Test applications of 10,000 car sets of the "Hi-Hat" plain journal bearing and wedge to freight cars in interchange service have been authorized by the AAR Mechanical Division Committee on Lubrication of Cars and Locomotives. This bearing, recently developed by the AAR Research Center, is a refinement of the current standard I-type steeple-back bearing (RL&C, June 1962, p 27). Angle of contact between the bearing and wedge is 45 deg in the steeple-back design. These side contact surfaces become vertical in the Hi-Hat type. Back is the same length, but is 1 in. wider.

Tests have shown that this arrangement gives greater stability to the journal assembly when it is subjected to coupling impacts. Greatly improved hot-box performance

(Continued on page 52)



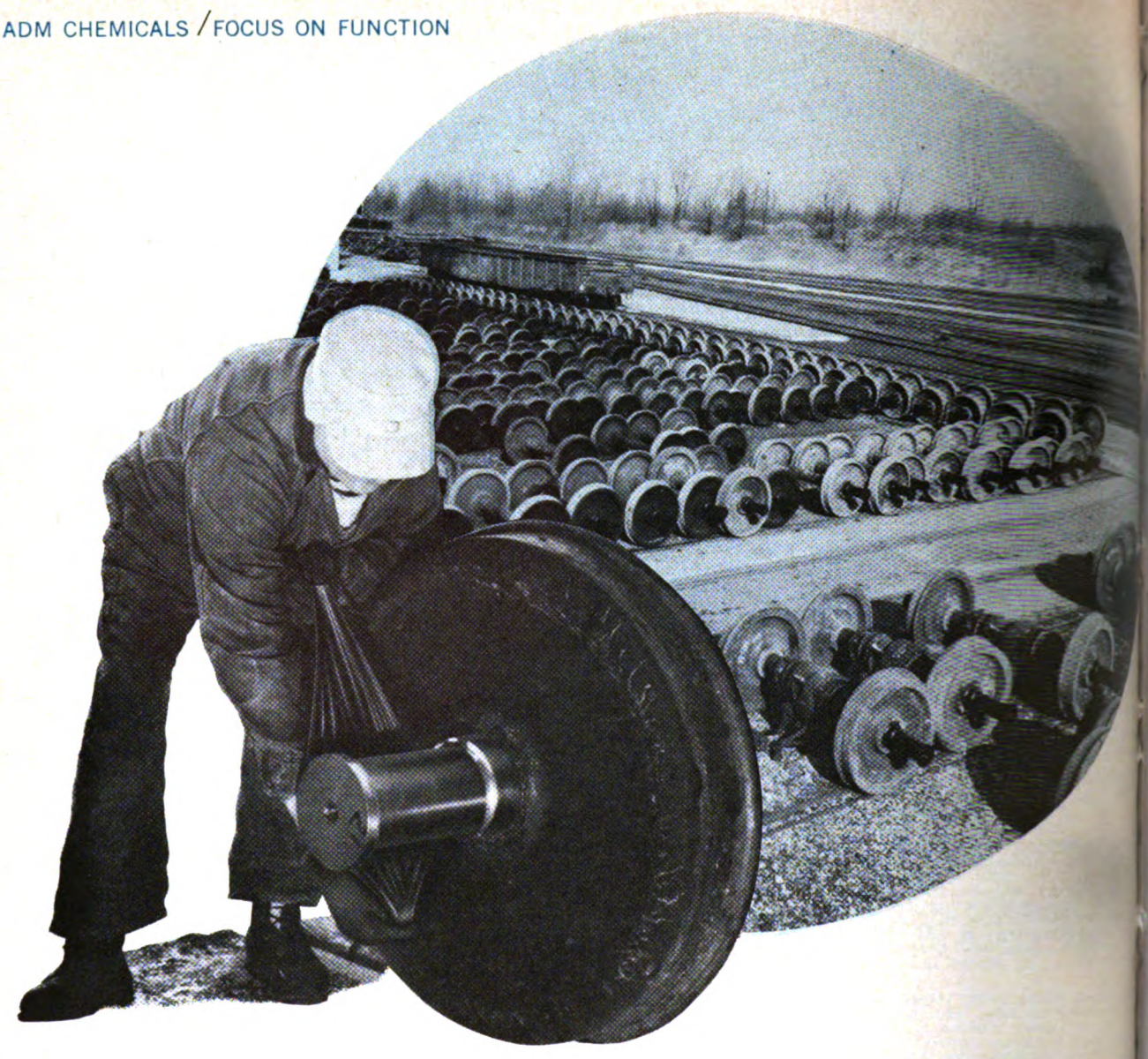
Vertical contact surfaces between the bearing and wedge are feature of new Hi-Hat design.

TIME SAVING IDEAS FOR OCTOBER

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Northern Pacific Builds 650 Single-Sheathed Box Cars 20
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Trade Publications 59
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Wheel shop saves $18,000 a year with Plasta-gard

New all-weather plastic coating strips off clean in seconds—This major road has the records to prove it. They coat journals on 36,000 pair of wheels a year. Figuring all material costs and labor, they save an average of 50¢ a pair.

Twenty-five major roads have switched from petroleum-based products to PLASTA-GARD. Savings on journal coating range from 40¢ to $1.00 per pair of wheels. These savings stem from coating removal time. Even after long exposure to sub-zero cold or sizzling sunlight, PLASTA-GARD peels off slick and clean in seconds. And this super-tough plastic assures positive all-weather protection against rust and corrosion.

PLASTA-GARD can be applied at any temperature. Formulations are available for brush or spray application.

Investigate the important econo and convenience of PLASTA-GARD s coating for your road. Send fo sample and cut your wheel protect and maintenance costs.

ADM

Freight Line

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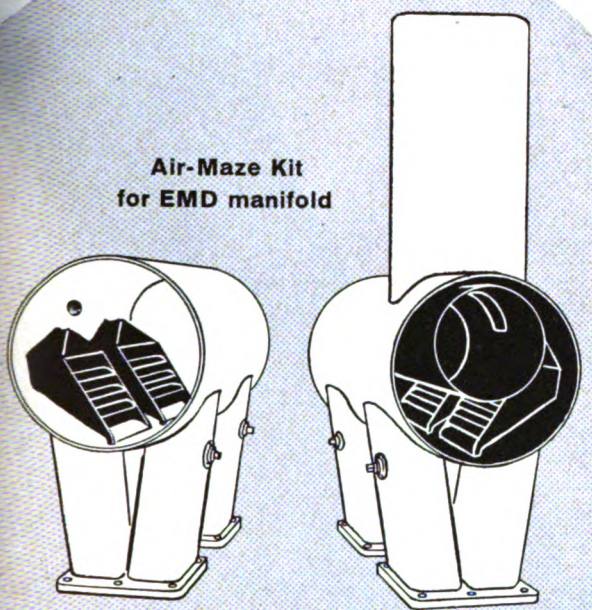
ARCHER DANIELS MIDLAND COMPANY 700 INVESTORS BUILDING MINNEAPOLIS 40, MINNESOTA

EASIER INSTALLATION... LESS DOWNTIME!

AIR-MAZE spark arrester conversion kits!

FOR DIESEL LOCOMOTIVES

Air-Maze Kit for EMD manifold

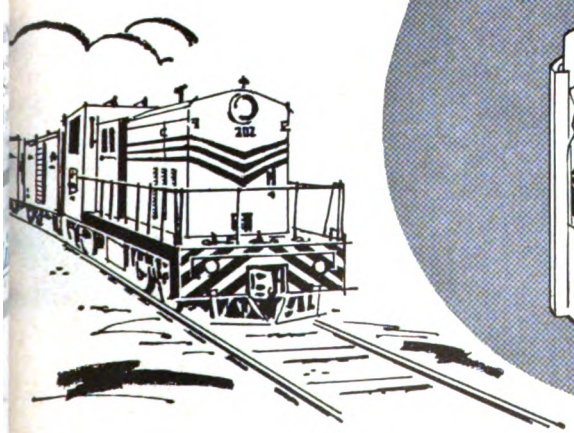


Air-Maze Spark Arrester Kits eliminate the need for obtaining a new manifold to get effective spark control. Deflecting vanes can be simply installed in original manifold during routine engine shopping. Simplified design minimizes number of man hours required for conversion . . . alignment problems sometimes encountered with fitting and welding are minimized.

The Air-Maze Spark Arrester is designed for use with the exhaust manifolds of both EMD and FM switcher and road units. It operates on the principle of centrifuging incandescent particles to reduce their size and temperature before they are exhausted. The addition of the Air-Maze Spark Arrester Kit does not affect engine performance.

Air-Maze Kit for FM manifold



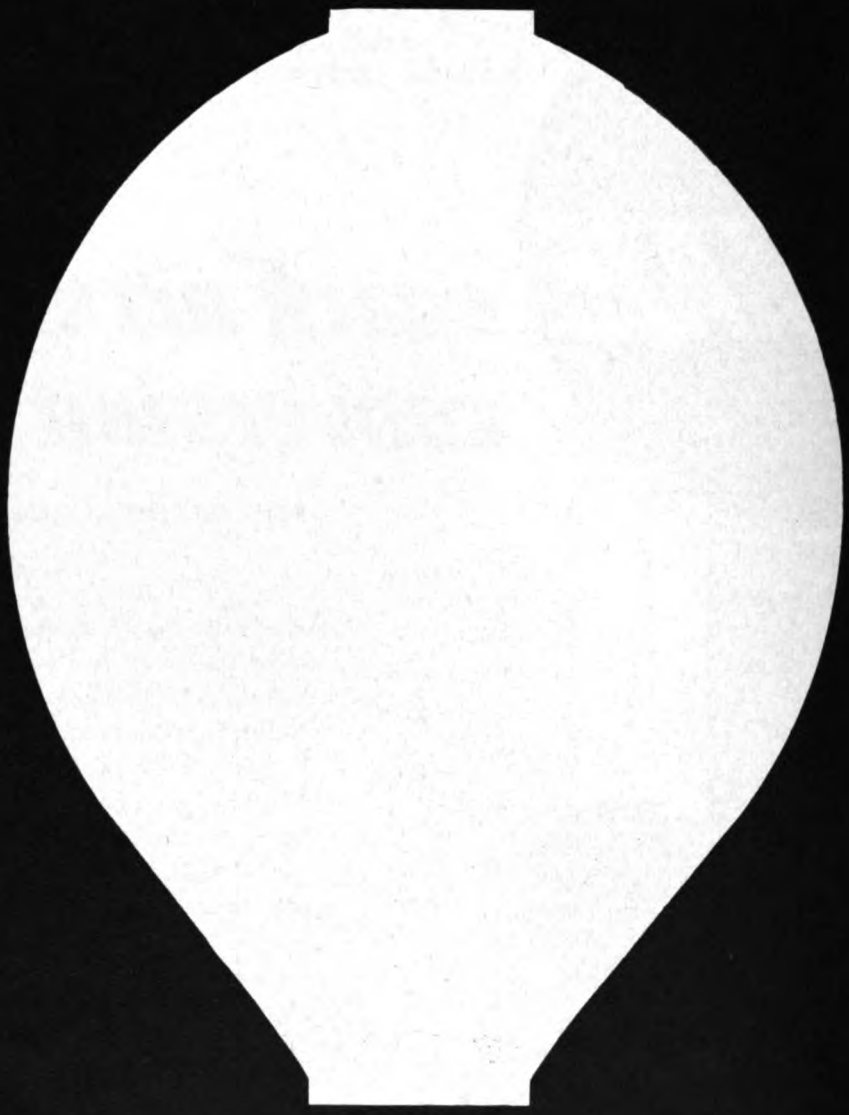


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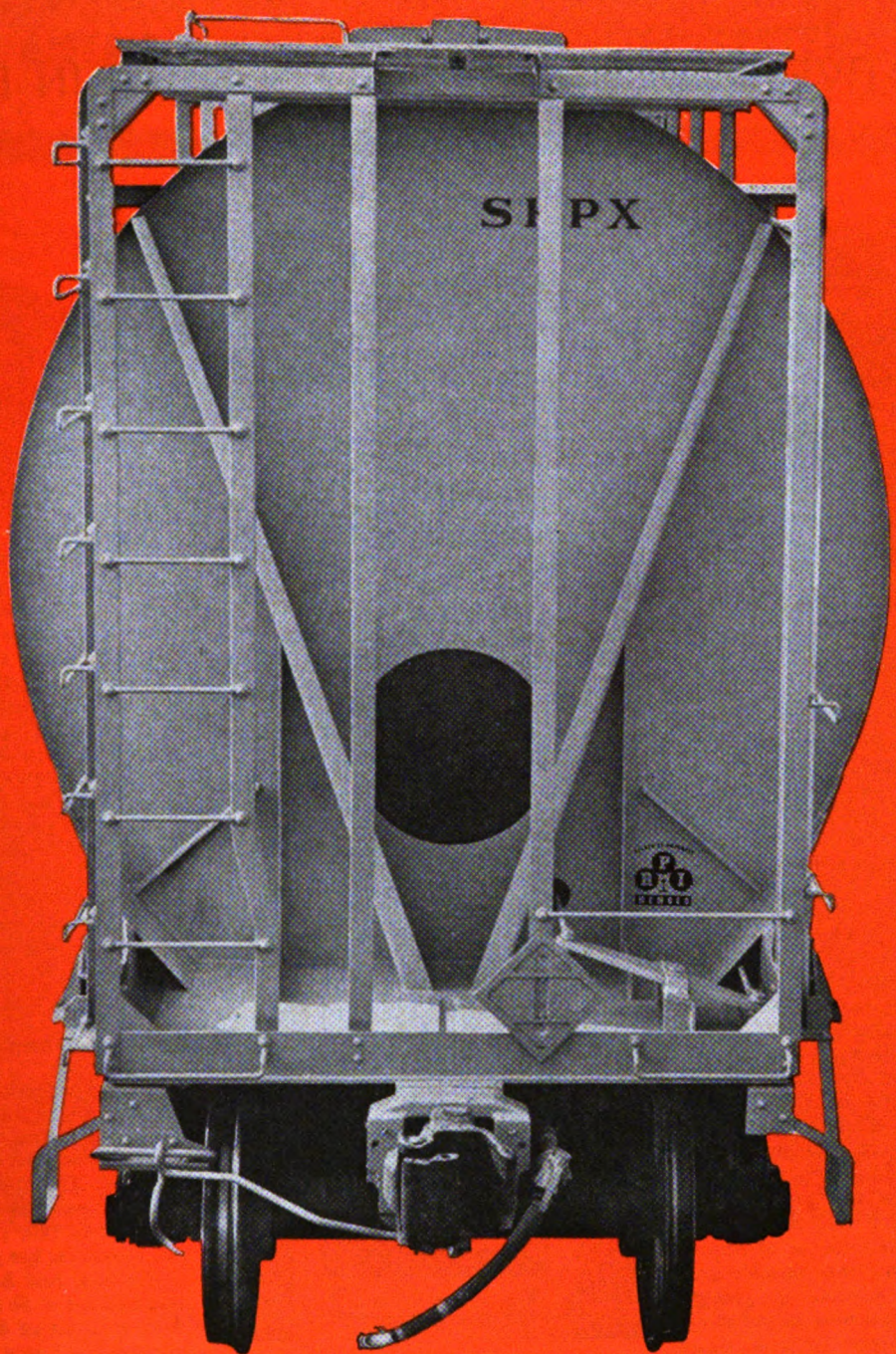
AIR-MAZE DIVISION
CLEVELAND 28, OHIO
ROCKWELL-STANDARD CORPORATION

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Why is it pear-shaped?



Why is the new ACF *CENTER FLOW* Car pear-shaped?

Good reason. With its unique, pear-shaped compartments, you can fill it to 97% of its capacity. This is the greatest use of cubic capacity by any dry bulk handling car.

Result: Railroads save money. Shippers save money. Because it takes fewer Center Flow Cars to do the job than boxy, old-fashioned type cars. And ACF Center Flow is a real lightweight . . . can carry bigger payloads every trip.

Fastest loading, too! Loading hatches are lined up down the center of the top of the car. No need to shift loading funnels from side to side to fill a Center Flow compartment.

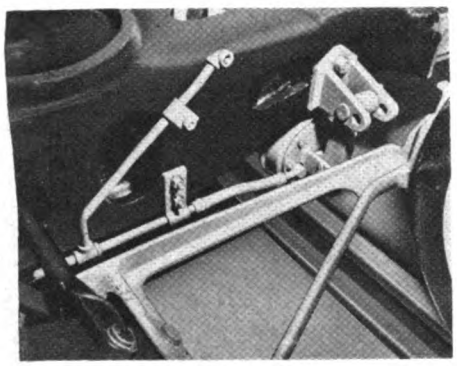
Fastest unloading! Grain, sugar, flour, chemicals, plastic pellets all slide out with the least possible hang-up. Unloading hatches are lined up center bottom. (No space-wasting center sill to get in the way as in old-style cars.) What's more, Center Flow compartments are smooth as a rifle bore—no obstructions to cause contamination. They're virtually self-cleaning.

We make the revolutionary ACF Center Flow in aluminum or steel, with either pneumatic or gravity outlets, and from 2600 to 4000 cubic foot capacities.

AMERICAN CAR AND FOUNDRY
DIVISION
ACF INDUSTRIES

For more facts about how Center Flow can cut shipping costs, time and labor, write Henry A. Correa, Vice President – Marketing, ACF Industries, 750 Third Avenue, New York 17, New York.

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Freight-Car Brake

The brake assembly of the Unifrate Variable-Load Brake consists of standard cast-steel unit brake beams supported conventionally in the truck side-frame pockets; hanger levers which abut the brake beams and force the shoes against the wheels, and rotochambers having 6-in. travel which are pinned to the lower ends of the hanger levers for transmission of braking power. The hanger levers are suspended from the truck bolster by means of brackets, riveted or bolted in place. The combination of beams mounted on unsprung members and the hanger levers mounted on the spring-supported bolsters results in a braking system which develops a variable shoe load. The mechanical advantage of the levers increases with spring deflection as the load in the car is increased. The rotochambers on 50- and 70-ton trucks are 30 and 36 sq. in.; on 90- and 100-ton trucks, 36 and 50 sq. in. In a number of cases where the relation of light-car weight to loaded-car weight has been such that the minimum AAR requirements for iron-shoe brakes could not be met without the use of empty-load brake equipment, the variable-load brake has made it possible to provide braking performance superior to the minimum AAR requirements for iron shoes without the use of empty-load brake equipment. Single-car breakaway stop tests on the Burlington, using a loaded TTX 70-ton car, are said to have shown the 31% braking power of the Unifrate brake to be equivalent in stopping performance to 75% braking power with a conventional brake with iron shoes. American Steel Foundries.

For more information, circle 10-1 on coupon on page 59.

Temperature Control

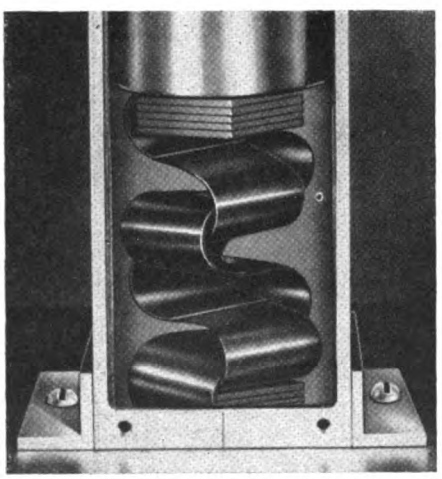
A diesel-engine cooling-water temperature control which can regulate shutters or shutters and radiator fans utilizes a two-contact mercury-tube thermostat as a sensor. The thermostat is mounted in a ½-in. pipe tap and completely enclosed in a metal housing for insertion in the water line on the outlet of the engine. It is said to be extremely accurate and not affected by dust, moisture, vibration, altitude, or ambient temperatures. Below 150 deg F shutters are closed and fan is off; between 150 and 160 deg, shutters are open and fan is operated at half speed, and above 160 deg shutters are open and fan is at full speed. Vapor Corp.

For more information, circle 10-2 on coupon on page 59.

Spray Cleaning Solvent

Dowclene EC, a chlorinated based material, is said to have the nonflammable and low toxicity characteristics of trichloroethane, a slower evaporation rate, and no adverse chemical reactions with most insulating varnishes. In tests, the solvent was found to readily dissolve greases, oils, crater compounds, and similar materials found on railroad electrical equipment. Dow Chemical Co.

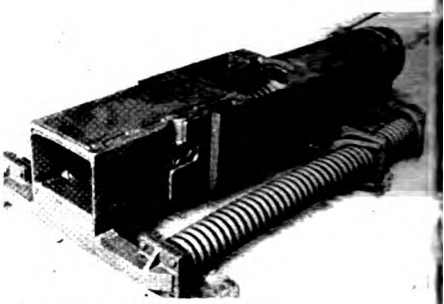
For more information, circle 10-3 on coupon on page 59.



Shock Absorber

An interleaved, flat spring is said to produce anti-resonance features in the AAcordio, a combined shock absorber and vibration isolator. Because of the sheathing—either a telescoping tube or steel bellows—and the arrangement of silicone foam and entrapped air, the leaves of the spring cannot "bottom." The frequency of the design is below 4 cycles per sec, while transmissibility at resonance has been measured to values as low as 1.3. The isolators are said to withstand temperatures from —60 deg C to 500 deg C and to be unaffected by salt spray, humidity, sand, dust, ozone, and most acids and bases. Different loading capabilities and different spring rates are obtained by varying the width of the spring, its thickness, the radii at the bends, the characteristics of the reinforcing members, and the materials. Vibration Corp. of America.

For more information, circle 10-4 on coupon on page 59.



Cushioning Device

The Hydra-Buff, an end-of-car cushioning device, consists of a single-ended, double-acting hydraulic cylinder, with direct fluid metering, which operates in parallel with a system of mechanical stops in addition to a high-capacity centering-spring system. The cylinder at each end of the car has a 14-in. stroke—12 in. in buff; 2 in. in draft. The unit, mounted in a special pocket built into the end of the center sill, is adaptable both to new and existing cars and has limited AAR approval for interchange. Model E12-2 is designed for use with Type E couplers; Model F12-2, for use with Type F couplers. A. O. Smith Corp.

For more information, circle 10-5 on coupon on page 59.

Transportation Finish

Polymil, a direct-to-metal freight-car finish, doubles as a primer and top coat and is said to produce a high gloss that will withstand severe weather and repeated cleaning. The coating can be sprayed on with conventional or airless equipment. It is heated to 140, 150, or 180 deg F at the gun nozzle for hot spray, but, for cold spray application, best flow, gloss and durability are obtained at 50 to 100 deg temperatures. A single coat of 8 mils wet yields a film thickness of 3 to 4 mils. DeSoto Chemical Coatings, Inc.

For more information, circle 10-6 on coupon on page 59.

Spray-Painting Equipment

Lacquers, enamels, vinyls and epoxies, can be handled in the Polaris two-gun airless spray-painting units—a 10-gal portable unit with roll-around cart and a 55-gal unit for use with open-top original material containers. The units can deliver 1 gal of material per min continuously, with 1.4 gal per min maximum delivery.

A Model 62 spray painting gun features a one-piece drop forged aluminum body with a corrosion resistant stainless-steel head and stainless-steel fluid passages. For handling abrasives, tungsten carbide needles and inserts are available. Binks Manufacturing Co.

For more information, circle 10-7 on coupon on page 59.

AMERICA'S FIRST 100% DIESELIZED SYSTEM...



GULF, MOBILE & OHIO

DEPENDS 100% ON NATIONAL BRUSHES
TRADE MARK

When the GM&O purchased their first diesel electric locomotive units 27 years ago, they began using "National" brushes. By 1949, the system was completely dieselized, with these brushes on over half the equipment. Because of proven maintenance savings and reliability, "National" brushes are now used on *all* road power traction motors and main generators.

Today, the GM&O operates over 250 diesels on its important link between the Great Lakes and the Gulf. Providing this efficient motive power fleet with dependable commutation and minimum commutator maintenance the year 'round is the vital job of "National" brushes.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact Mr. National Carbo

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UNION PACIFIC

A NATIONAL BRUSH USER FOR 25 YEARS

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The Union Pacific's 10,000-mile system covers a vast region of great productivity and spectacular scenery.

Operating under varying conditions of desert heat, low humidity, and Rocky Mountain grades, Union Pacific's traction motors and main generators use "National" brushes for reliable commutation with minimum commutator maintenance.

From its initial use of "National" brushes over 25 years ago, the system now has them on many of its diesels... to provide power for speedy Domeliners and 100-car freight trains... to assure maximum performance hour after hour.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes.

This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact Mr. National Carbon

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NATIONAL CARBON COMPANY

EDITORIALS

Master Boiler Maker

This publication was not aware of the death of Albert F. Stiglmeier on January 16 of this year. Belatedly, we wish to take this opportunity to pay our respects to a fine gentleman who made an outstanding contribution to the art of boilermaking.

Al Stiglmeier was retired general supervisor of boilers and welding, New York Central, but he was more widely known as the man who guided so skillfully the Master Boiler Makers' Association as its secretary-treasurer for almost half of its 53-year history. As one privileged to work many years with this group of men dedicated to improving boiler design, fabrication and maintenance, the writer knows the value of this association's work, the high standards of its membership, and was aware of the excellent job Mr. Stiglmeier did in leading the organization.

The MBMA was held together during the depression years largely through Al's efforts but no individual could stop technological progress. The passing of the steam locomotive forced the Master Boiler Makers' Association to disband in April 1954 and signalled the end of an era. The passing of Al Stiglmeier ended the career of a man closely identified with that era, a man with a heart as stout as the equipment he fabricated.

Race Horse and Mule

Both American railroads operating the 4,000-hp Krauss-Maffei diesel-hydraulic locomotives have now released preliminary information on their performance. From these initial favorable reports it appears certain that the future of the diesel-hydraulic design in this country is a promising one.

Undoubtedly, more complete test data will be made available before long but, on the basis of these two preliminary reports, the locomotives' performance seems to verify the claims made for the design. They have excellent acceleration and adhesion characteristics. They can operate at very slow speeds without damage to the transmission, a limiting factor in the diesel-electric.

Representatives of both railroads used similar terminology in describing the locomotives' performance. In June the Denver & Rio Grande Western's assistant director of research, J. J. Schmidt, said diesel-hydraulic locomotives should prove to be "highly-successful haulers of heavy high-speed freight traffic in mountainous territory" (RL&C, July 1962, p 42). Last month, before the Locomotive Maintenance Officers Association, Southern Pacific's manager of mechanical engineering and research, P. V. Garin, said an outstanding advantage of these motive power units is their ability "to expedite trains in heavy mountain service" (See Page 30 of this issue).

Before these units were tested, most railroad men anticipated that the hydraulic transmission would be the most troublesome component. To the contrary, its operation has been trouble-free. Difficulties appeared in other components but, for the most part, these seem to be not unusual for locomotives considered experimental. In regards to maintenance, Mr. Garin said that there is nothing in the design that is "outside our capabilities."

When Mr. Garin told the LMOA that the diesel-hydraulics have the "qualities of the race horse and the mule," he implied that they have the horsepower required for high-speed service, that they also can produce the draw-bar pull so useful in mountain territory. Motive power units with these desirable characteristics should be most welcome to American railroads' operating departments.

'28 To 38 By '68'

Progressive removal of cast-iron wheels from service under American freight cars is apparently not going to mean that repair-track and wheel-shop stocking problems are to be greatly simplified. By 1968, when the last cast-iron wheels are scheduled to disappear from under interchange freight cars, railroads will be operating freight cars with a wide variety of wheel sizes. Even though the AAR Interchange Rules will require that all these be either of wrought or cast steel, it is not now certain just how many sizes will be in use.

To reduce the deck height of piggy-back cars, the 28-in. diameter wheel, 5 in. smaller than the conventional 33-in. freight-car type, is being used in growing volume. To overcome the damage to rails which can result from high wheel loads, the 36-in. wheel is already required on all cars of greater than 70-ton capacity. Up until recently, this inevitably meant 90-ton or 100-ton-capacity cars. "Greater than 70-ton capacity" may not much longer mean this automatically. Talk of 150-ton and 200-ton cars is common; several railroads have already been working on such designs. Even the rail loads imposed by a loaded 100-ton car on 36-in. wheels do not comply fully with the standards set by the joint AAR Mechanical Division and American Railway Engineering Association group two years ago. At last June's Mechanical Division meeting, it was revealed that the Wheel and Axle Committee and wheel manufacturers were working on a 38-in. wheel for freight service. All these developments will mean a major change in wheel-shop and repair-track procedures which not long ago involved only 33-in. wheels for freight cars. The changing picture was well summarized by M. S. Riegel, technical consultant of the Wrought Steel Wheel Committee of the American Iron and Steel Institute, when he told the recent Car Department Officers meeting that it would be "28 to 38 by '68." He commended the Wheel and Axle Committee's work in standardizing flange contours which are all to be of the thick type previously the standard for only one-wear wheels (RL&C, July 1962, p 27). He then urged that treads be standardized so that the running surfaces of all wheels have the same contours. In view of the diversity of wheel sizes now in use (and still longer ones may be introduced), it would seem advisable to standardize wherever possible.



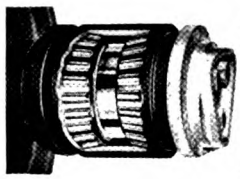


100,000

The 100,000th Timken® bearing-equipped freight car recently was launched. And if this seems like a drop in the bucket compared with the 1,900,000 freight cars on the railroads today, consider this: just in the past 5 years, new cars equipped with roller bearings jumped from 10% to 75% of those ordered—and a majority of them went on Timken tapered roller bearings.

The trend to "Roller Freight" is picking up speed and momentum like a crack cross-country express. There is good reason. Timken bearings solve the hot box problem. They roll over one hundred million miles on the average between car setouts due to overheated bearings. Timken bearings keep cars in service and cut operating and maintenance costs to the bone. And they reduce inspection time drastically—cut lubrication costs, too. It's the result of precision manufacture from nickel-rich steel—the quality that's built into Timken bearings to give top performance.

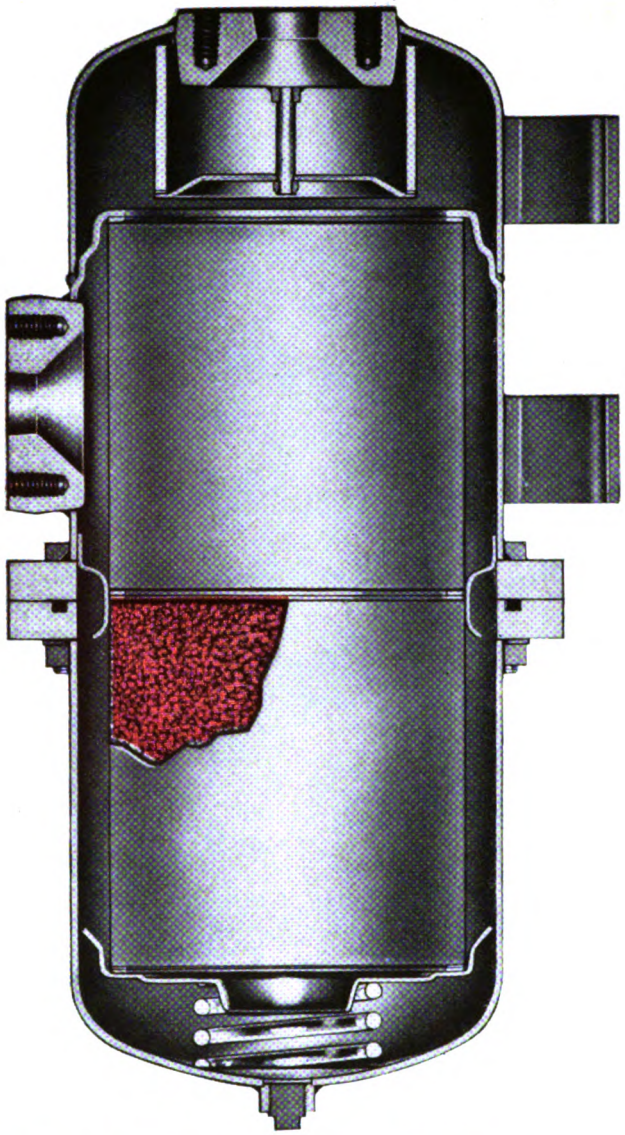
Every railroad has profited from "Roller Freight" cars through interchange. Many railroads and other freight car owners are now putting practically all their new freight cars on roller bearings and Timken "AP" bearings are leading the way. When all freight is "Roller Freight", America's railroads will save millions in maintenance and operating costs. The Timken Roller Bearing Company, Canton 6, Ohio.



QUALITY TURNS ON HEAVY DUTY

TIMKEN®

TAPERED ROLLER BEARINGS



VAPOLEX Filters

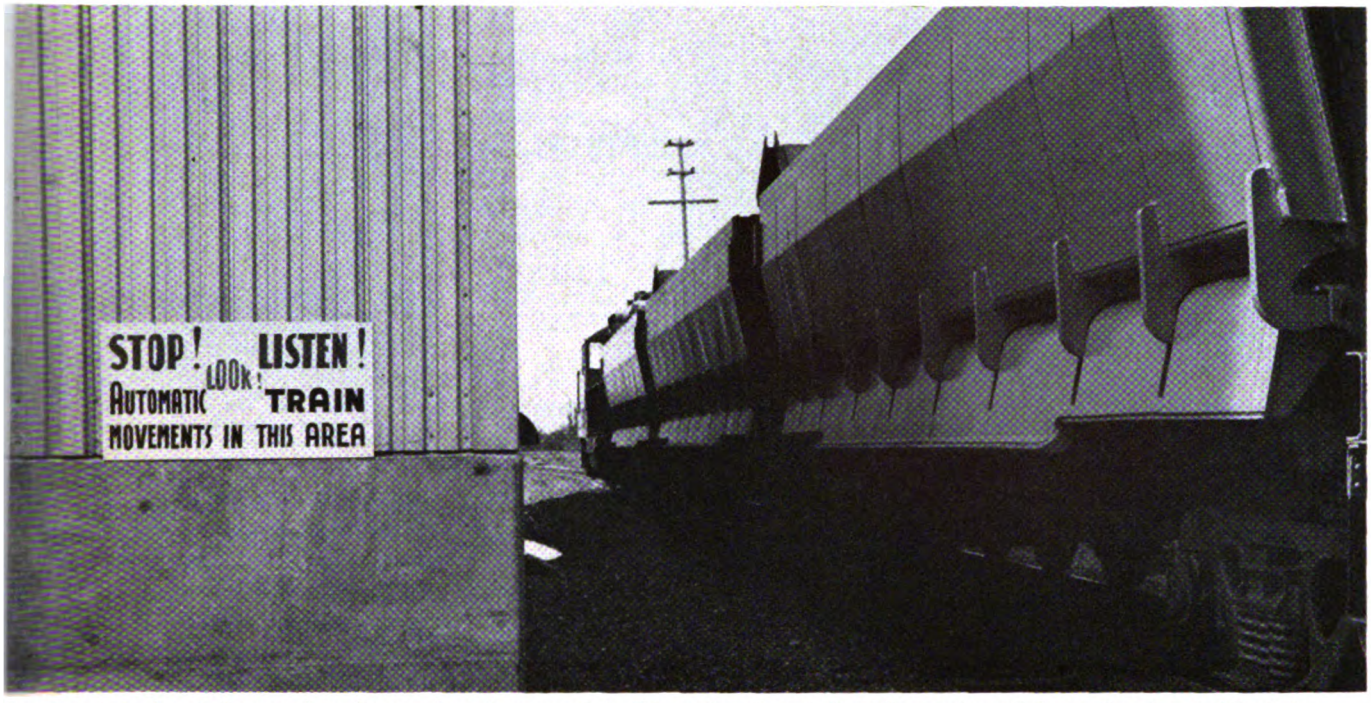
protect air brake systems from oil, carbon, gum and varnish producing substances

Service tests on railroads in different sections of the country, under all operating conditions, prove the effectiveness of Westinghouse Air Brake Division's new VAPOLEX Filter. Even where the air compressor was a known "oil passer," VAPOLEX Filters were found to retain their high efficiency for six months . . . twelve months and even longer. Makes other main reservoir filters unnecessary. Low-cost throw-away filter inserts provide simplified maintenance and extended intervals between cleanings. Your Westinghouse Air Brake Division Representative will review in detail the desirable features provided by this filter.

WABCO

WESTINGHOUSE AIR BRAKE DIVISION

WILMERDING, PA./Westinghouse Air Brake Company



Crewless train departs from crusher after cars have been emptied. This portion of run is "push" operation with locomotive at rear of the train.

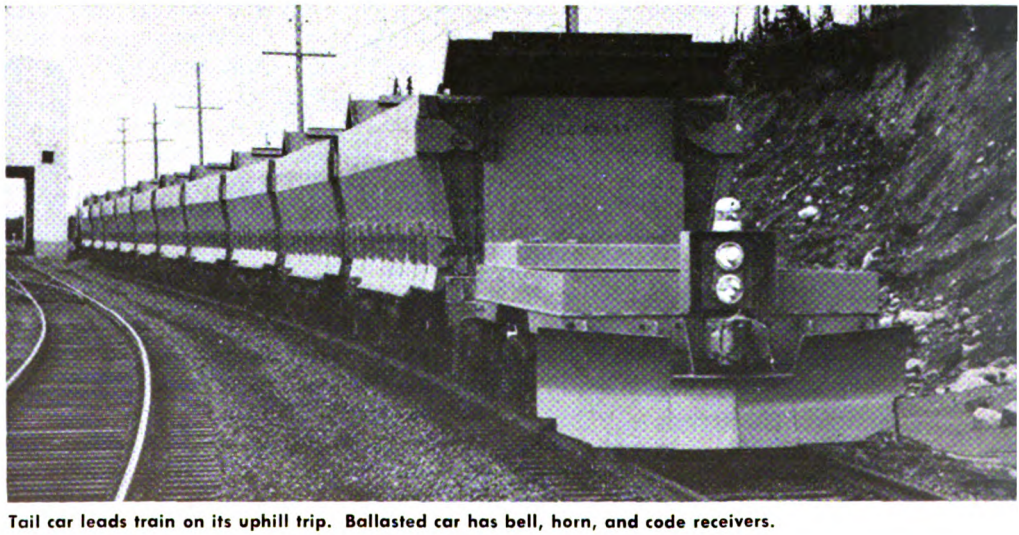
Automated Trains Move Canadian Ore

Push-pull concept is combined with ATO, achieving crewless freight movements in western Labrador

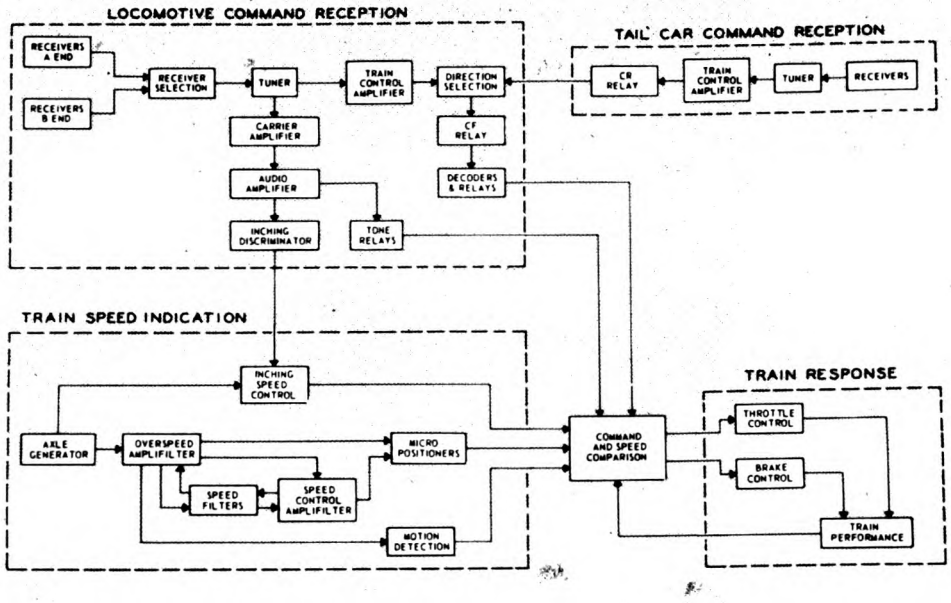
The world's first automated, crewless freight trains have gone into service in Labrador. Designed for an ore-hauling operation of the Iron Ore Company of Canada, these trains shuttle back and forth over a six-mile route near Labrador City, Nfld. When the mining operation reaches full capacity, there will be four 18-car trains moving back and forth over the line automatically to transfer about 60,000 tons of crude ore daily from loading pockets at the mine to a crusher at the concentrating plant.

All this represents the culmination of development work undertaken over three years ago with the aim of achieving automated freight-train operation on the ore-handling railroads of this rapidly expanding mining region. The Air Brake Division of Westinghouse Air Brake, General Motors Diesel, and General Railway Signal cooperated in developing the controls and equipment for the wayside, locomotive, and car installations necessary for this automatic train operation (ATO). Preliminary work at the GMD plant in London, Ont., was followed by road tests with actual trains on Canadian National lines near London (RL&C, Nov. 1960, p 21).

Locomotives for the Labrador operation are conventional GMD units



Tail car leads train on its uphill trip. Ballasted car has bell, horn, and code receivers.



Schematic arrangement of units on locomotive shows relation of various receiving, sensing, and command components. Feedback is important feature of such an automated control system.



Manual automatic changeover panel on locomotive is used to put unit in proper program

which have been equipped with the ATO control equipment. National Steel Car, Hamilton, Ont., built the special dump cars used in the trains.

In addition to full automation, the 18-car trains, each of which is powered by a GMD GP-9 locomotive, have introduced the push-pull concept to freight operation. A special ballasted tail car at the rear of each train is equipped with a snow-plow pilot, bell, warning light, headlight, and the train-control receivers needed for the automated operation. While the locomotive operates at the head of the train during its loaded trips down the continuous 0.2% descending grade from the loading site to the dumper at the crusher, the tail car becomes the leading vehicle on the return trip. In this position, it operates with warning lights illuminated and bell sounding while its train-control receivers pick up the track code which is then transmitted through a train line to the locomotive 18 cars away. When the locomotive is leading the train, the track code is fed directly into receivers which are mounted in the conventional position ahead of the leading wheels of the locomotive's lead truck.

The locomotive operation is directed automatically from the wayside by coded a-c current. This is a refinement and extension of the standard coded track-circuit installations which General Railway Signal has previously supplied for use on railroads that have cab signals, automatic train stop, or speed control. The code consists of a-c energy at 60 cycles that is interrupted at varying frequencies to determine the nature of the commands given to the train. The codes used for the line haul are: 37.5 per min—service braking; 75 per min—7.5 mph train speed; 120 per min—15 mph train speed; 180 per min—30 mph train speed; 270 per min—reverse. At the loading and unloading sites where very precise controls are necessary to achieve the "inching" speeds of ⅛ to ⅜ mph necessary for precise car spotting, tone-modulated 960-cycle carrier signals are supplied through loops between the rails. All the commands are generated in the GRS wayside equipment which regulates not only train speed and braking, but also automatically arranges meets on the single-track line and establishes routes at loading and crusher stations.

The a-c coded controls and tone controls, or commands, are transmitted continuously in the rails toward the train. On the train, they are picked up by the receivers coupled inductively to the rails. The commands are compared with actual train speed as detected by an electronic speed governor. The resultant output is then converted to relay operation, automatically controlling the locomotive governor and the locomotive and train brake systems in the proper manner for optimum train handling.

Each of the GP-9 1,750-hp locomotives used in this operation has had its short hood fitted with an equipment rack containing all the GRS devices needed to transmit, interpret, and compare the wayside commands and translate them into signals which can be utilized for locomotive control. The locomotives are owned by the Quebec North Shore & Labrador, the 357-mile main line ore-hauling railroad also controlled by the Iron Ore Company of Canada.

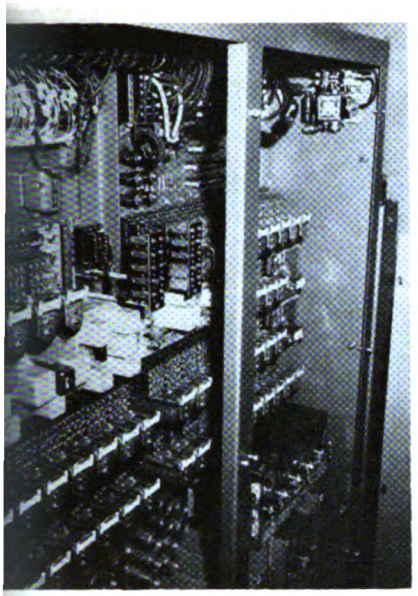
One axle of the locomotive also is fitted with frequency generator which produces an a-c voltage with frequency proportional to train speed.

Outputs of the axle generator and its associated electronic equipment are used to detect (1) speeds ½ mph above or below the selected speed; (2) overspeed—when the train is 2 mph over the selected speed, and (3) motion—when the train is moving more than 1 mph.

The various outputs from the command reception and train-speed indication sections of the train-carried equipment are compared in the command and speed comparison section. This section applies the proper commands to the locomotive brake and throttle controls. Locomotive performance is continuously checked to ascertain whether the train is responding according to the commands.

ATO control wires are connected from the command section to the terminals on the GP-9: AV, BV, CV, DV, EX and ORS (all engine speed control); RE and FO (reverse and forward); and LRC (load regulator control). The PY wire, in the PC circuit, is broken and is controlled through the ATO equipment. A new ground breaker rest control is added to the system.

Signals are received by the ATO equipment from the load regulator, the NV (no voltage) relay, the low-c



quipment rack with decoding and command ontrols is mounted in locomotive's short hood.

ressure switch, the hot-engine alarm, he ground breaker, the generator field ontactor, the load-meter shunt, and rom additional pressure switches laced in the locomotive air-brake ystem.

The manual-automatic changeover anel, located in the short hood, is sed to put the locomotive back in the utomatic sequence after it has been ff the automatic railroad for servicing. During servicing it is manually controlled.

Train speed is maintained by cycling the power application up or down. For example, for maintaining 30 mph, he power is reduced at 30.5 mph. If he train reduces speed to 29.5 mph, additional power is applied and the cycle is repeated. However, if the power is reduced on a train operating at 30.5 mph and its speed increases to 32 mph (due to down grade), service braking is applied to reduce the speed to 30 mph. The cycle is then repeated.

Continuously variable control is provided on the locomotive for the inching speed. This control, which is via a modulated-carrier signal picked up from the high-frequency track loops, is very precise. It controls train speeds—on a continuously variable basis—between ⅛ and ⅜ mph plus or minus $\frac{1}{100}$ mph. The regular running speeds are maintained within ½ mph.

The system is designed on fail-safe principles. Any failure of the continuous command stream causes a stop. Likewise, a central indicating and control console, located in the dumper building, provides complete facilities for manual override of all automatic operations as well as indications of train positions and system status.

Brake Equipment

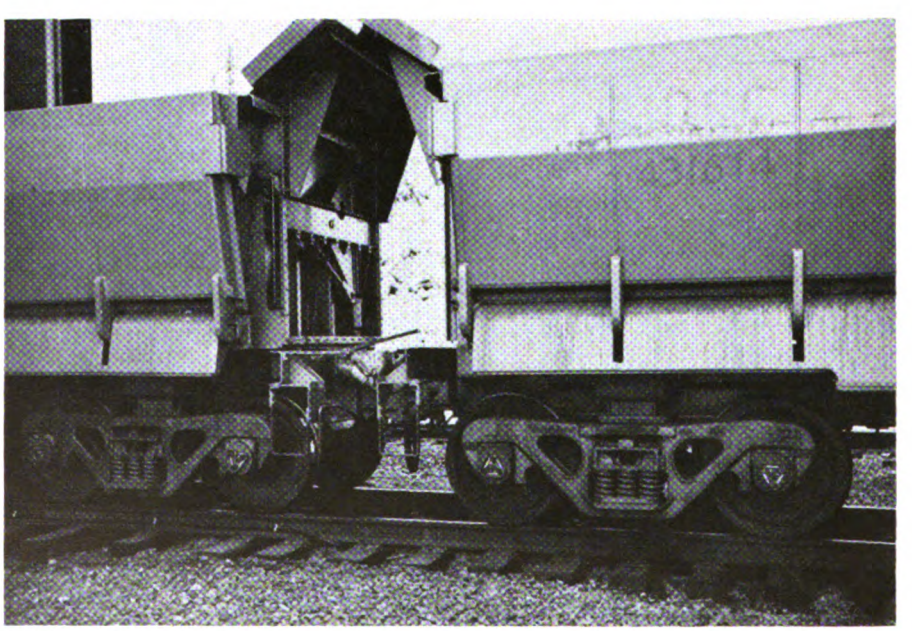
The brake equipment on the crewless trains is electro-pneumatic straight air. 24-L locomotive brake equipment is converted to automated electro-pneumatic operation by the addition of three magnet valves—Application Magnet Valve, Full-Release Magnet Valve, and Emergency Magnet Valve. Two wires—Brake Application Wire and Inshot Retention Wire — run throughout the train, wired to corresponding Application and Retention Magnets on each car.

In the shuttling operation, the application and release magnets on the locomotive and the application magnet on each car are energized or de-energized by code command to apply or release brakes. In other words, the brakes are either all on or all off. In inching, or at low speed during loading and dumping, the inshot retention wire is energized or de-energized by the tone-modulated code to operate the retention magnet on each car, modulating the braking to a light application, as the code commands. This is sufficient to hold the Cobra shoes against the wheels, creating a dragging action that permits precise inching.

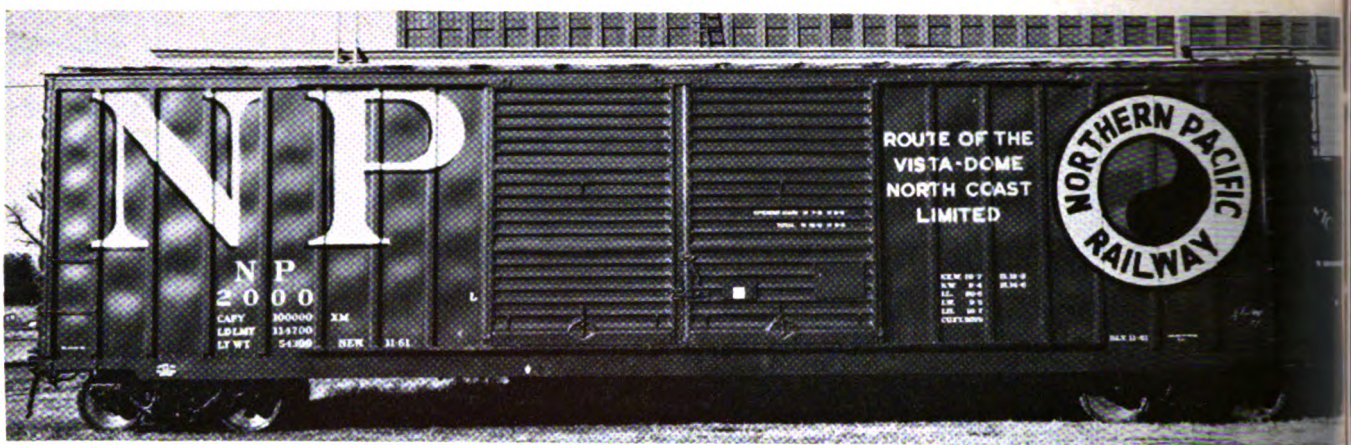
The emergency magnet on the locomotive is normally closed and, in the event of unusual action such as loss of code signal, will open and vent brake-pipe pressure from the face of the service piston of the D-24 control valve which will develop a full service brake application on the locomotive and cars. The trains are equipped with a brake pipe connecting locomotive and cars, and each car has a plain triple valve and auxiliary reservoir. An emergency brake-pipe reduction from the locomotive, therefore, will be transmitted to all cars. Likewise, emergency action originating in the train, such as parting during shuttling, will cause a brake-pipe reduction and full service brake application, transmitted to all cars and locomotives.



xtension on truck side frame is used for clamping car to rail during dumping operation when rms rise up to tip body so ore is emptied.

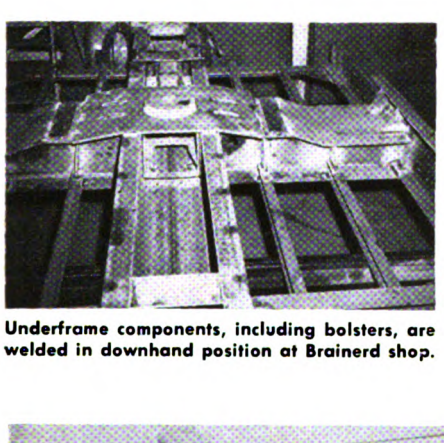


Multi-conductor electric train line extends through cars with standard jumpers between. Extensions over ends allow loading to proceed almost continuously as train inches through the loading station. Dump cars were specially designed for this heavy-duty ore hauling operation.

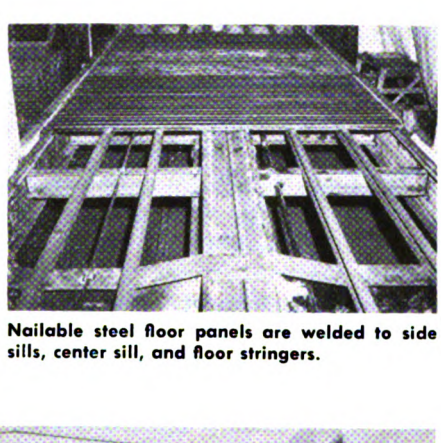


Exterior side posts are distinguishing feature of NP cars which were designed to have maximum cubic capacity to handle packaged ladings.

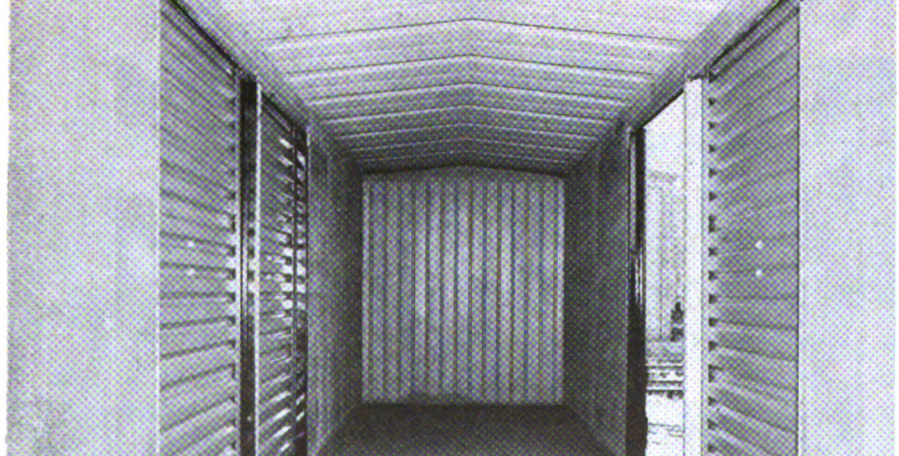
Single-Sheathed Cars Built for Lumber Loads



Underframe components, including bolsters, are welded in downhand position at Brainerd shop.



Nailable steel floor panels are welded to side sills, center sill, and floor stringers.



Exterior side posts and recessed lading anchors produce smooth interior in 5,079-cu ft cars. All interior surfaces, including the end linings and the nailable flooring, are steel.

Construction of 650 single-sheathed, double-door steel box cars has been completed by the Northern Pacific at its Brainerd, Minn., shops. The 50-ton, 50-ft 6-in. cars, equipped with exterior side posts, nailable-steel floors, roller bearings and special end linings, were built primarily for lumber and other packaged commodities requiring maximum cubic capacity. The exterior side posts and recessed lading anchors provide a smooth interior.

The NP design, all-welded steel underframe provides for uniform loading and consists of two Z-26, 41.2-lb center-sill sections welded full length, two 15-in., 40-lb side-sill channels and two 9.8-lb, 6 x 3½ x $\frac{5}{16}$-in. rolled-angle end sills. The four steel crossbearers are built-up welded construction with $\frac{5}{16}$-in. web plates, 6 x ½-in. top cover plates, 6 x ⅜-in. bottom cover plates, and bottom tie plates. The five 7-in., 15.3-lb I-beam crossties are welded to the side sills and center sill. Each body bolster is also a built-up steel design, with ⅜-in. web plates, 24 x ½-in. top cover plates, 20 x ⅝-in. bottom cover plates, and 24 x ⅝-in. bottom tie plates. Two 3-in., 5.7-lb I-beam floor stringers each side of center sill extend in one length between body bolsters, passing over the tops of the crossties and contoured crossbearers. They are welded to the underframe members. The four I-beam stringers at the ends of car are welded to the end sill and body bolster.

The steel sides are an NP design. Each car set is fabricated from 28 hat-section ⅛-in. intermediate posts, four box-section door posts, four $\frac{3}{16}$-in. hat-section corner posts, 32 ⅛-in. Cor-Ten side sheets, and two $\frac{3}{16}$-in.

(Continued on page 51)



New control components and wiring in foreground are to be applied to unit undergoing rebuilding in C&NW shop following major electrical fire.

Should Diesel Wire Be Higher Quality?

...'Yes,' says C&NW Electrical Engineer L. E. Legg

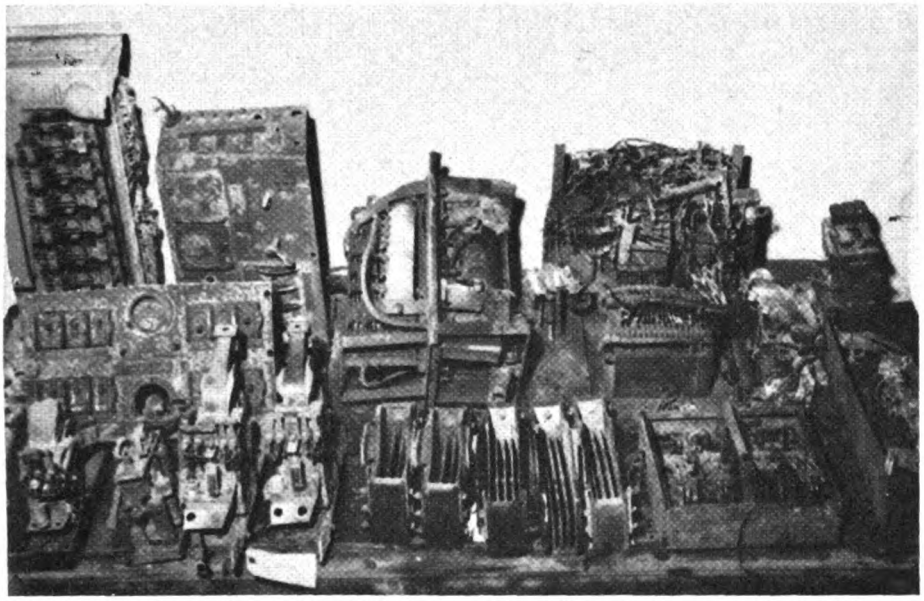
Wire with new types of insulation has been used by the Chicago & North Western for rewiring its diesel locomotives. These glass-braid - covered silicone and Teflon insulations are flame and heat resistant and are impervious to moisture, oil and solvents. The insulations have also proved to have good mechanical strength and good aging qualities, making them well suited for locomotive wiring. Smaller sized wire can be substituted, saving time and simplifying installation.

Three years ago silicone wiring was used on 19 Fairbanks-Morse road switchers in changing the governors from pneumatic to electro-hydraulic control. In 1959 and 1960 the same type of wire was used in 62 Elcon self-synchronizing cabinets applied to C&NW locomotives equipped with the Cummins auxiliary diesel engines which supply a-c power to push-pull trains (RL&C, Dec. 1959, p 22). Based on these trouble-free installations, an EMD road switcher has recently been completely rewired with the glass-braid-covered silicone wire. Although this application is desirable because of the flame resistance qualities, there had been some concern that the wire's insulation might not have the physical strength to withstand the sustained abuse to which it is normally subjected in locomotive service. It proved, however, to be far superior to anything used up to that time. An Alco road switcher is now scheduled for rewiring with Teflon insulated wire.

Cost of the average quantity of high-quality neoprene-insulated wire now used in a C&NW locomotive unit is approximately $250. The same quantity of the same sizes of Teflon-insulated wire costs approximately $560. While the cost of this material is considerably higher, volume purchases would, no doubt, reduce it some. Even this material cost is low when compared with the cost of one of the more serious locomotive fires which sometimes runs well into five figures. The C&NW believes that once a locomotive has been wired with Teflon-insulated conductors it would never again have to be rewired.

On early diesel-electric locomotive wiring varnished - cambric insulation was used almost exclusively. Because this type of insulation readily absorbed moisture, grounds were prevalent. Eventually, the builders adopted neoprene-insulated wire, the type now used almost exclusively. This was a great improvement over the original varnished cambric, doing much to keep the locomotive free from grounds. However, it was soon found that neoprene-insulated wire and cable support combustion.

This article was prepared by L. E. Legg, electrical engineer, Chicago & North Western. It expresses the opinion of the author on a subject which he regards as of major importance in locomotive design and service.





Short-circuited electrical component (right) started fire which spread through wiring to main generator and cab interior. After blaze was extinguished, all the parts shown at left were removed from the unit because they had been damaged beyond repair.

If an electrical component on one of these locomotives is short circuited, the wiring leading to it ignites. The flame can spread quickly because of the wiring's combustible characteristics. At times, all of the wiring in the control cabinet may be destroyed. Approximately half of all locomotive fires fall into the "serious" category. Minor repairs may cost approximately $3,000; major ones upwards of $7,000, not considering the extended period a locomotive might be out of service.

While diesel locomotives will operate just as well with conventional wiring as with the newly developed types, conventional wiring, when exposed to an open flame resulting from a short circuit, heavy ground or flashover, may be completely destroyed in two or three minutes. With some of the newer insulations having improved heat and flame resistance, the damage would be limited only to one circuit, requiring but minor repairs.

The C&NW laboratory, recognizing both the fire hazards involved with aging diesel locomotives and the frequency of serious fires, has conducted extensive tests of different types of wire. It was found that all the conventional wire used today will support combustion and that some will burn violently after being ignited. Although some of the better products are more flame resistant than others, all will ignite and sustain flame readily.

A limited quantity of glass-braid-covered silicone wire is used by manufacturers in locomotive wiring, principally at locations where elevated temperatures are found. Tests show that the insulation of this wire does burn at a slow rate if there is considerable heat. When ignited and then removed from the source of heat, however, it will not sustain combustion. If a short circuit occurs in a unit wired with silicone wire, chances are good that the resulting fire will not spread to other circuits. After a glass-braided silicone-insulated wire has been overheated, the circuit can still function because the glass braid and charred silicone continue to adhere to the wire, acting as insulation. With conventional neoprene-insulated wire, the insulation falls away after burning.

Teflon Insulation

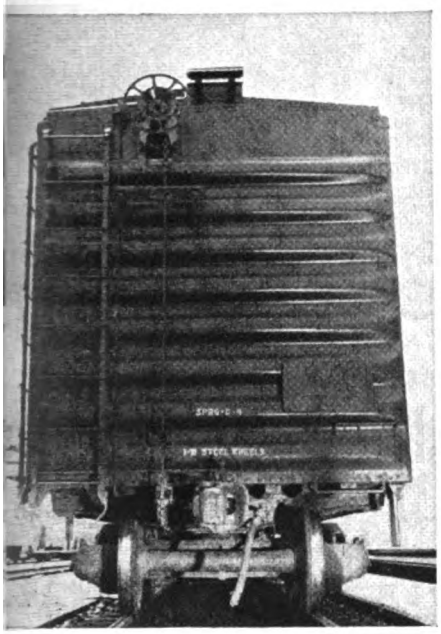
Although glass-braid silicone-covered wire has good heat, aging and low temperature characteristics, it has several disadvantages. Its resistance to solvents and abrasion is not good. Along with the solvents occasionally used to clean electrical cabinets, wiring is also exposed to fuel and lubricating oils. Wire manufacturers, in attempting to overcome these shortcomings by coating the glass braid with lacquer or plastic, have introduced other problems: lower flame resistance, reduced flexibility, and less resistance to aging.

Teflon, a fluocarbon resin, is used extensively by the military and the aircraft industry as a wiring insulation. This material, which has outstanding weathering qualities, is very tough and strong at temperatures ranging from minus 85 deg C to plus 200 deg C. The dielectric strength is excellent over a wide temperature range. It is not affected by solvents. Laboratory tests on Teflon-insulated wire showed that it would support combustion. When ignited and removed from the source of heat, however, it would not sustain combustion. If held near the heat source, the flame would continue. In an electrical cabinet, its ignition qualities would be much like those of glass-braid-covered silicone wire.

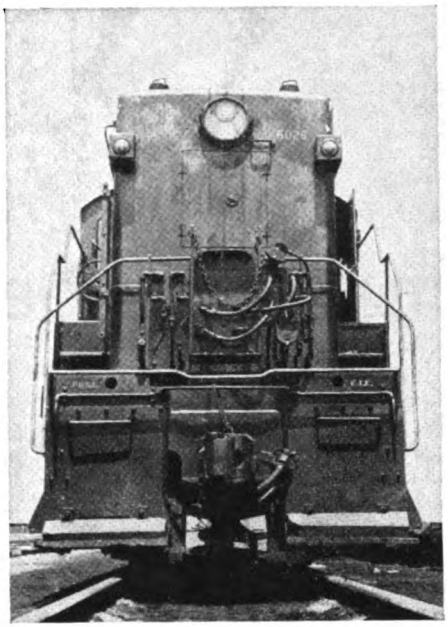
Wire suppliers, interested in the work of the C&NW laboratory, have cooperated by offering a variety of materials for test. Tests are currently being made on Hypalon synthetic rubber, a chloro-sulfonated polyethylene. This insulation is favored by the trucking industry because of its long life and resistance to heat and flame. Hypalon is a thermosetting vulcanized compound which will not melt when in contact with a hot wire. Although Teflon is thermoplastic, its melting temperature is high enough to render it competitive with Hypalon. Another feature of these new insulations is color coding, currently being furnished by one manufacturer.

If locomotive builders do not adopt these new wiring materials as standard, they might offer them as alternates, with the railroads paying the increased cost. It would seem pointless to perpetuate the fire hazard now inherent in diesel-electric locomotives. Car manufacturers should also investigate these materials.

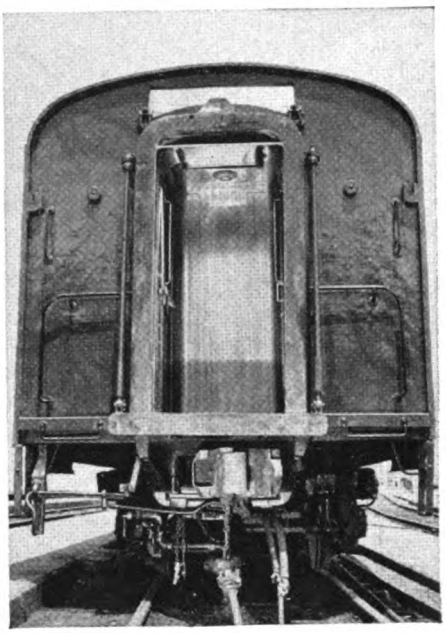
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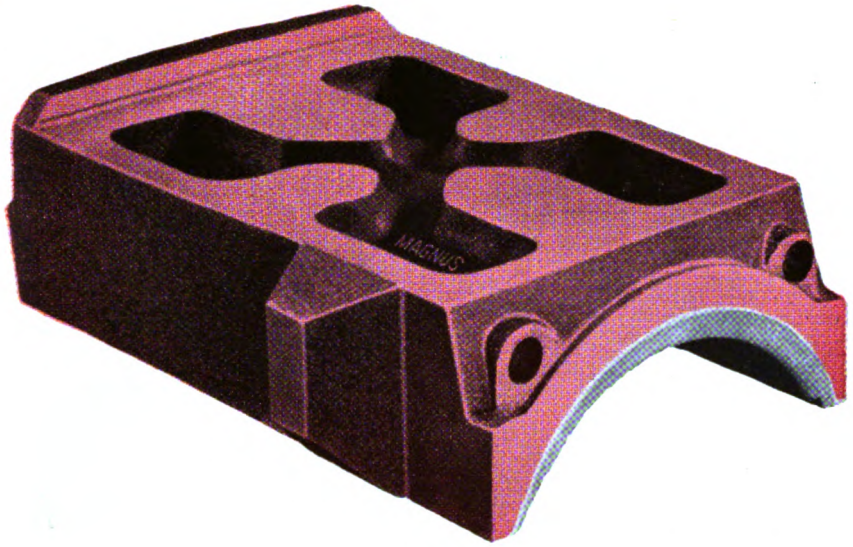
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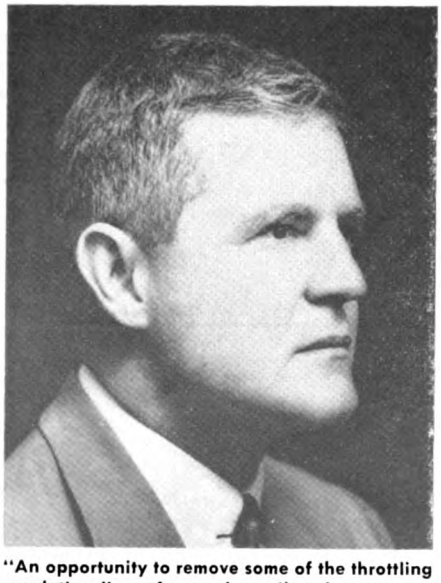
More Technology, Less Regulation Are Needed



Tax effect of higher depreciation allowances inspired Santa Fe to spend $20 million for freight and passanger cars, says President E. S. Marsh.



"Subsidies are a major reason why we have an oversupply of transportation facilities today," explains J. F. Nash, NYC vice-president.



"An opportunity to remove some of the throttling regulations" confronts the railroads now, according to H. W. Large, PRR vice-president.

More technical innovation and less government regulation are goals toward which mechanical officers must strive. That was the concensus of speakers at last month's Coordinated meetings in Chicago. The annual sessions of the Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers heard several railway executives express concern over the political climate in which the carriers operate.

"The spirit and determination of people like you in this business manages to overcome most of the physical problems involved in railroad operation," E. S. Marsh, Sante Fe president, told a joint meeting of the Air Brake and Car Department Officers Associations. "It would, of course, be done faster and more fully if adequate earnings were available to accomplish all the things that are desirable . . . The railroads are suffering from a long continuation of unequal competitive opportunity in the transportation field with artificial diversion of traffic. This, combined with the inflationary spiral common to all industry, has produced a slow deterioration in railroad earnings which should be corrected before it is too late," he said.

Along with urging intensified efforts to obtain passage of the recommendations of President Kennedy's Transportation Message to Congress last April 5, Mr. Marsh challenged air brake and car officers to solve a technical problem which he said results in "the most useless and unproductive expense we have on the railroads." Freight loss and damage, which costs railroads over $100 million annually, "is a rather serious reflection upon us as common carriers and leaves some ugly scars on customer relations."

Continuing, Mr. Marsh said: "A very large part of the staggering damage payments results from improper train handling involving not only train separations, but also failure properly to control slack and, of course, rough handling in yards . . . We have better tools and equipment to work with today than ever before—dynamic brakes and improved braking equipment throughout. Many trains move from origin to destination without switching at intermediate terminals, reducing the number of times cars are handled in yards. Traffic control systems and other signaling improvements reduce the number of stops en route. Despite this progress and educational efforts to get better train handling and better control of impacts in switching operations, the record does not reflect improvement.

"Car department officers carry the responsibility for preparing equipment which will be in good mechanical condition and fit for the loading intended. Poorly prepared cars, unclean cars, and equipment in defective condition are major causes of loss and damage. Substantial claim payments result from derailments which are usually caused by defective rolling equipment.

"Billions of dollars have been poured into new freight cars since the end of World War II incorporating many technological advancements such as better riding trucks, lubricating pads, journal stops, roller bearings, improved interior materials, and sliding sills. Even these innovations need adequate attention. Thousands of older cars must be kept in the best mechanical condition possible and made suitable for handling commodities for which they are used.

"Your immediate challenge," the Santa Fe president continued, "is to minimize the causes of loss and damage with the equipment now available. Perhaps your greatest challenge is more difficult; that is, to design equipment and braking systems so scientifically engineered that they will automatically prevent damage by virtually defying the frailties of the human element, if that is possible."

Calling for an end to government policies and practices which he said were "sidetracking" U. S. railroads in favor of other forms of transportation, J. F. Nash, vice president-operation, New York Central, asked for efforts to revive "a dangerously weakened railroad industry." The government, he told the annual convention luncheon, "is regulating the transportation costs of the American people

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Car Department Officers Association: *President*—C. W. Kimball, chief of car inspection, Southern; *First Vice-President*—E. W. Morris, engineer car equipment, Canadian Pacific; *Second Vice-President*—G. J. Flanagan, general mechanical superintendent-car, New York Central; *Third Vice-President*—D. C. Graves, vice-president, Union Tank Car Co.; *Fourth Vice-President*—J. R. Douglass, assistant chief mechanical officer-equipment, Louisville & Nashville. *Secretary-Treasurer*—E. W. Gebhardt.

Locomotive Maintenance Officers Association: *President*—C. A. Love, chief mechanical officer, Louisville & Nashville; *First Vice-President*—H. N. Chastain, general assistant mechanical department; *Second Vice-President*—J. J. Ekin, superintendent special equipment and parts manufacture, Baltimore & Ohio; *Third Vice-President*—T. Murray, master mechanic, St. Louis-San Francisco; *Fourth Vice-President*—C. L. Hall, assistant general mechanical superintendent-locomotive, New York Central; *Fifth Vice-President*, G. M. Beisher, assistant chief mechanical officer, Baltimore & Ohio. *Secretary-Treasurer*—C. M. Lipscomb.

Railway Fuel and Operating Officers Association: *President*—L. M. Leikel, road foreman of engines, Baltimore & Ohio; *First Vice-President*—N. C. Sweetin, road foreman equipment, St. Louis-San Francisco; *Second Vice-President*—Marvin A. Davis, chief road foreman, Delaware & Hudson; *Third Vice-President*—A. C. Raborn, traveling engineer, Illinois Central. *Secretary-Treasurer*—L. H. Peters.

pward, not downward; it is preserv-
ıg monopoly, not preventing it; it is
tiffling progress, not promoting it . . .
'he railroads must not be treated as
n alternative which can be side-
racked in favor of other forms of
ransportation. He concluded by ask-
ıg that railroad managements, labor
nd suppliers cooperate in efforts to
roduce the sound transportation sys-
em America needs.

This cooperation was also urged by
I. W. Large, vice president and re-
ional manager, Pennsylvania, who
old the Railway Fuel and Operating
Officers Association that "for the first
ime in this century the railroad indus-
ry has an opportunity to make some
eal strides forward in its effort to re-
nove some of the throttling regula-
ions under which it has suffered."

Equipment maintenance is a func-
ion which can be a most important
actor in enabling railroads to provide
better service at lower cost. D. W. Dickie, chief of motive power and rolling stock, Canadian Pacific, told the Locomotive Maintenance Officers.

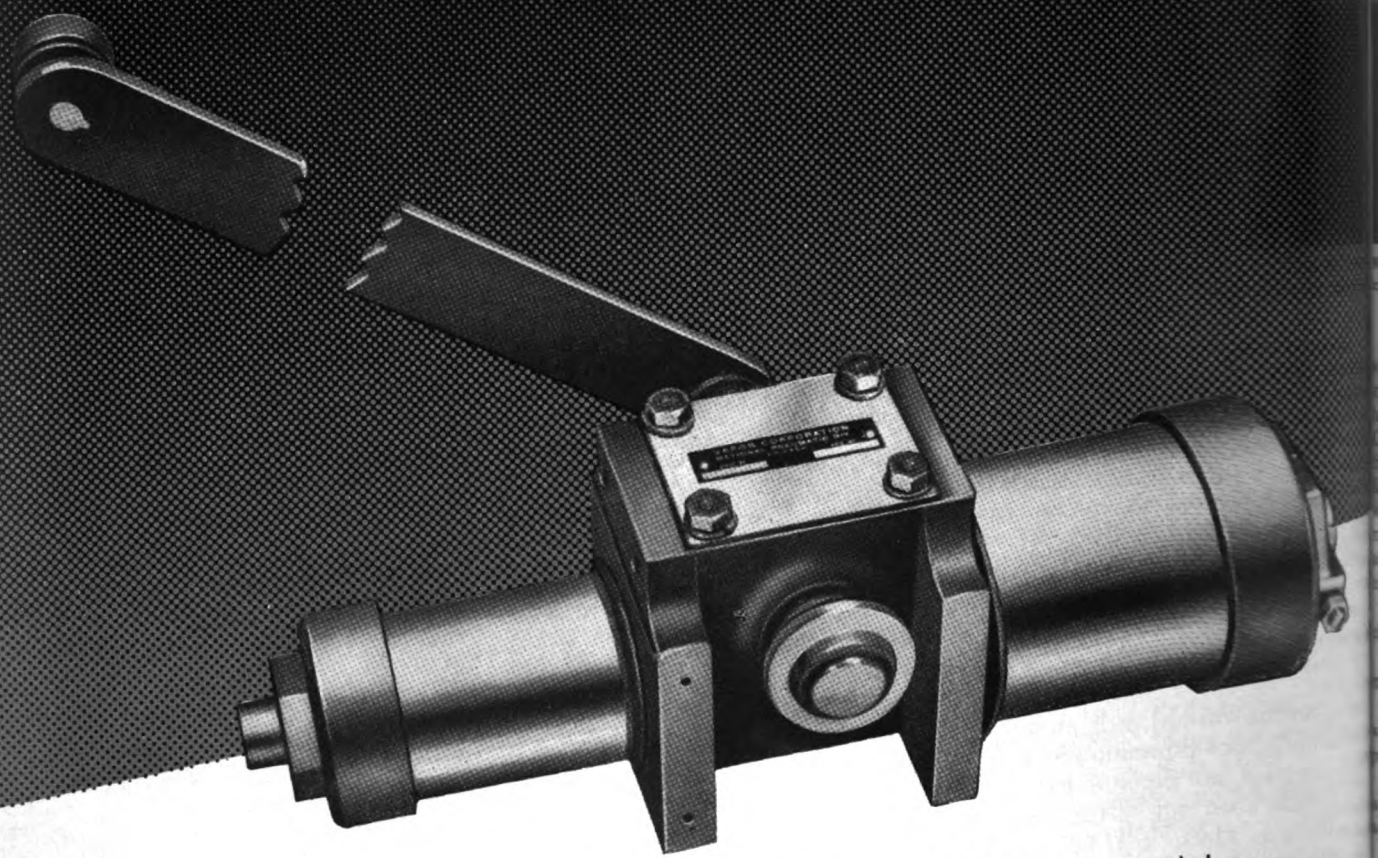
"With the rapid changes necessary to meet the many tough, demanding assignments presented to us by shippers," he said, "it is essential that we continue to be fully cognizant of the latest and most efficient improvements in components—and that we have the 'know how' to maintain them properly." Four areas in which mechanical officers are in a position to achieve savings and reduce maintenance costs, as outlined by Mr. Dickie, are:

- Utilization of motive power;
- Plant and tooling involved in equipment-maintenance facilities;
- Supervision of equipment-maintenance operations;
- Cost control over repair and inspection work."

"Railroads would do well to consider the development of planning, industrial engineering, and quality control staffs to assist in developing and administering more economical maintenance operations," R. E. Harrison, LMOA president, told the organization. While recent equipment developments have been outstanding, Mr. Harrison said, "they still are not adequate for today because rapidly changing conditions are creating a greater demand for higher horse-power locomotives, specialized cars, and increased train speeds . . . In particular, there is a continuing need for motive power that requires minimum maintenance and parts replacement. Motive power in use today requires minimum maintenance and parts replacement. Motive power in use today requires too many engine, cooling system, electrical, and truck overhauls."

Continued ▸

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M. Keller, AAR, forecasts "no en-route serv-ıg of journal bearings in North America."

10,000,000 Miles per Set-Off

Citing the growing number of railroads ıich operate with journal-box perform-ces of more than one million miles per t box set off, the Car Department Officers ımmittee on Car Lubrication pointed out ıt this would be only one hot box in the :time of two average freight cars, each of ich was calculated to operate 460,000 les in its 30-year life. Most important in ıieving this, according to the Committee, :

- Application of pad lubricators, which ninate the waste grab;
- Journal finish, which is now fixed at 16 roinch;
- Controlled bearing and journal sizes, ch have eliminated high unit bearing sures;

Change in the wedge radius to 50 in., :h assures the free movement of the ge and even loading of the bearing;

Elimination of cast-iron wheels, which ns an end to shelling and brake burns cause damage to the bearing.

commenting on these factors and the re of the journal improvement program, M. Keller, AAR vice president—re-:h, stated: "Review our environmental itions. They are certainly not getting ıetter. In the past years when we drop-n a hot July or August below 100,000 per hot box set-out, we pointed to the hot weather as an extenuating factor ıll of us hoped it would be cooler, if or our own personal comfort, then at for journal performance. Speeds of ıt trains are being increased. Coupling :ts are no more gentle, and we have ıcreased the load limit of cars by 5%. f these factors provide increasingly conditions under which journal bear-ust operate.

aring performance has improved y in the last year and a half. The fol-ş are cumulative averages of miles per set-off for the first six months of 1962:

January	728,992
Average, first 2 months	761,032
Average, first 3 months	796,545
Average, first 4 months	845,156
Average, first 5 months	867,486
Average, first 6 months	878,717

It is evident that the summer months will not now lower the mileage per hot box, and it appears that we will slowly approach an annual average of a million miles.

"For the first six months of 1962 we had a total of 17,508 hot-box set-outs but, of this total, 4,678, or 26.7%, occurred where boxes were not equipped with lubricators and other bearing improvements. This percentage represents about one fourth of all the hot boxes experienced and becomes even more startling when the small number of cars having waste is considered. It is obvious that the continued use of this means of lubrication is very uneconomical in the light of present technology.

"Journal bearings not only support the vertical and lateral loads, but they also provide all of the force necessary to swivel trucks on curves. When center-plate friction is high, the lateral pressure on the bearing must be increased to overcome it. The AAR Research Center is making a study of this. Various lubricants, liners, and shims were tried, but nothing outstanding has yet developed. The Research Center then began an experiment with a rubber-and-steel-laminated center plate. In this design, the laminations or sandwich are fastened to the car-body and truck-bolster center plates in such a way as to prevent any movement between the outer surfaces of the sandwich and the car and bolster center plates. Casual consideration of this scheme might suggest that the moment or force required to swivel the truck under a loaded car would be very great. In the actual experiments, it was found that the resistance with this design was about the same as with a well-lubricated standard center plate, but that the experimental design had only a fraction of the resistance of a dry standard center plate. Center plates do not hold lubrication very well, and this new idea may be a method of eliminating the need for lubrication at this point while improving bearing operating conditions. Experiments with this design of center plate will be continued. We are encouraged by the results and think that an improved center plate will be the result of this work. However, if this design should develop to the point where it is not considered an improvement over the present arrangement, we will try another design. We believe we can improve center plates.

"Another idea that has great promise is journal stabilization. Some means of controlling the longitudinal journal position in the box is essential to optimum bearing conditions. So far as a statistical analysis can show, it appears that when the improvements already made can be supplemented with longitudinal stabilization, an average of two million miles per hot box set-out can be expected. Unanswered is the question of what will be the most practical method of getting the stabilization. The first method developed was with journal stops applied to the sides of the box. This method of stabilization has performed well, and the bearing performance with this system has been quite gratifying. The cost of some of the journal stops, while moderate, has been a factor which apparently has limited the number of applications.

"In an attempt to get some degree of this improvement without journal stops, two bearings have been developed. These designs are generally called the 'flat back' and 'Hi-Hat' bearings. The designs were originated to prevent longitudinal displacement under coupling impacts, brake-shoe pressure, or shocks from passing over frogs, switches, and other track irregularities. The early experience is encouraging.

"It appears that the minimum distance any lubricator can run without the addition of free oil is somewhat more than 1,000 miles, although most lubricators will operate for many times that distance without requiring the addition of free oil. In order to avoid waste of oil, it was decided to study the selection of locations or stations where free oiling would be required to fit within the 1,000-mile distance. This study is in progress. We believe that some time and trial arrangements will be required to develop a practical program.

"Roller bearings are giving a good account of themselves. Hot boxes have been few in number, and the manufacturers have made commendable efforts to reduce price and servicing. It appears that the proposed four-year regreasing period can be made a reality, with some further study and experience. The new breather for the bearing appears to be another advance in the performance of the bearings.

"Historially, the journal bearing has been an aggravating cause of delays. It is also of special note that increasing our mileage per hot box set-out about fourfold has resulted in eliminating the necessity for much servicing. This means less terminal delay.

"All the technical advancements in journal bearings are resulting in fewer train delays and more reliable schedules. But we have not finished the job. Our present goal of two million miles per set-out is only an interim one; ten million miles is more like what we need. Whatever changes we need to reach a goal of this magnitude will have to be made. And it must be done by requiring not more than a simple kind of servicing performed only at extended mileage intervals. I hope I am not looking very far into the future when I foresee no en-route servicing on journal bearings on any freight train in North America. But to accomplish these objectives, we must have ideas and put them to work.

Continued ▶

Hydraulic: 'Race Horse and Mule'



"While employing European concepts, they were built to American standards," says P. V. Garin.

After more than 75,000 miles of operation, the transmissions of the diesel-hydraulic locomotives put into service by the Southern Pacific late last year have shown no discernible wear. P. V. Garin, SP manager of mechanical engineering and research told the LMOA of the recent inspection made on the engines and transmissions of his road's 4,000-hp experimental German-built units (RL&C, Sept. 1961, p 23). There were no signs of corrosion on the impellers and manufacturing tool marks were still in evidence. "This Voith transmission has lived up to all expectations," Mr. Garin concluded. At the inspection, the Maybach engines were "clean."

There has been no difficulty in the maintenance of these locomotives because "there is nothing outside our maintenance capabilities" the SP officer said.

The three SP diesel-hydraulic units give about the same performance as seven 1,500-hp diesel-electric units in mountain service. Acceleration characteristics have been "exceptional." One example: Three hydraulics with 3,454 trailing tons had about the same acceleration rate as eight 1,500-hp diesel-electrics hauling 3,558 trailing tons. Dynamometer tests of the three units have shown development of as high as 284,000 lb drawbar pull on heavy grades. One unit developed 110,000 lb, an adhesion rate of 33%.

On mountain grades the hydraulics can operate at very slow speeds. Mr. Garin cited one instance when the three unit locomotive moved a tonnage train at a speed of 1 mph as it followed a trainman walking ahead to check for slide conditions. Dynamic braking has been very satisfactory with the three-unit locomotive developing 122,000 lb retardation at 24 mph. It was stated that the units do slip on occasion and that such slips are corrected by slight power reduction. One experimental run took the three units 2,911 miles from Roseville, Cal. to St. Louis, Mo., over the SP and SP subsidiary Cotton Belt in 69 hours with 21 crew changes. Mr. Garin mentioned that many of these enginemen had never before seen the locomotive and that after only brief instruction by road foremen were able to operate it successfully. Out of Los Angeles on this run the locomotive moved 5,700 tons. On this entire trip it produced 15 million gross ton miles.

Since going into service the locomotives have piled up about 300 million gross ton miles. The units have made 121 round trips from Roseville to Sparks, Nev., over the 2.4% ruling grade in the Sierra Nevadas. They have also operated 69 round trips from Roseville to Eugene, Ore., over the Cascades and have made other runs in miscellaneous services. From an operating standpoint Mr. Garin characterized the diesel-hydraulic as combining the qualities of the race horse and the mule.

Although originally built with pneumatic throttle controls which made it impossible to operate them in multiple with diesel-electrics, the diesel-hydraulics are to be changed to an electro-pneumatic control system which will make them completely compatible. Primary reason for the change of the pneumatic throttle system was difficulty encountered in m-u operation of the hydraulic units themselves. During cold weather there was some difficulty in reversing the units because of this pneumatic system. The Denver & Rio Grande Western, which got three units of the same type from Krauss Maffei has also encountered pneumatic control problems and is converting its diesel hydraulics to electro-pneumatic control (RL&C, July 1962, p 42).

Other changes which have been made since the SP units went into service included lowering of the engine air intakes in the carbody to overcome an air starvation problem encountered with trailing units in tunnels, and addition of snubbers to the truck spring system to correct uncomfortable carbody rocking resulting from the staggered track joints used in the U.S. The engines have no fuel limiting system, but such control is to be applied. V-belt drives on locomotive auxiliaries have given trouble.

Wheel wear has been very satisfactory, it was reported. Mr. Garin said that the SP wheel-truing machines can be used on these locomotives.

Fuel for the high-horsepower 1,580-rpm Maybach engines is somewhat critical, although the units have operated on fuels as low as 35 cetane. Transmission fluid has presented no problems. On heavy pulls, the transmission oil operates at about 200 deg F, well within the 240 deg F used as a design figure. Mr. Garin explained: "The success of this type of locomotive depends upon an adequate cooling system because the temperatures of the transmission oil, engine lubricating oil, and intake air are vital to the proper performance of the equipment. The cooling units have been carefully designed to provide for all conditions of service. These units, one for each engine and transmission set, are suspended from the roof.

Commenting on the overall design, Mr. Garin pointed out that these are not European locomotives, but represent the embodiment of European concepts in American-style locomotives. He termed them "purely "experimental," saying that the diesel engines should not now be considered in evaluation of the hydraulic-drive concept; maintenance costs cannot presently be used for comparative purposes.

"While these locomotives employ European concepts and components," said Mr. Garin, "they were built to American standards of strength and construction, meeting specifications developed jointly by the engineering staffs of the railroads and the locomotive builder. Many details are based on American standards which have been employed wherever possible. These include couplers, draft gear, air brakes, air compressors, headlights, wheels, brake shoes, roller bearings, filters, sanders, and safety appliances. Except for the engines and transmissions, U.S. standard threads have generally been used throughout. The transmissions, drive shafts, gearings, underframe and truck frames have been designed and strengthened to meet the more rigorous demands of our railroad service as compared with that in Europe" . . . These units employ a propulsion system not yet available in this country."

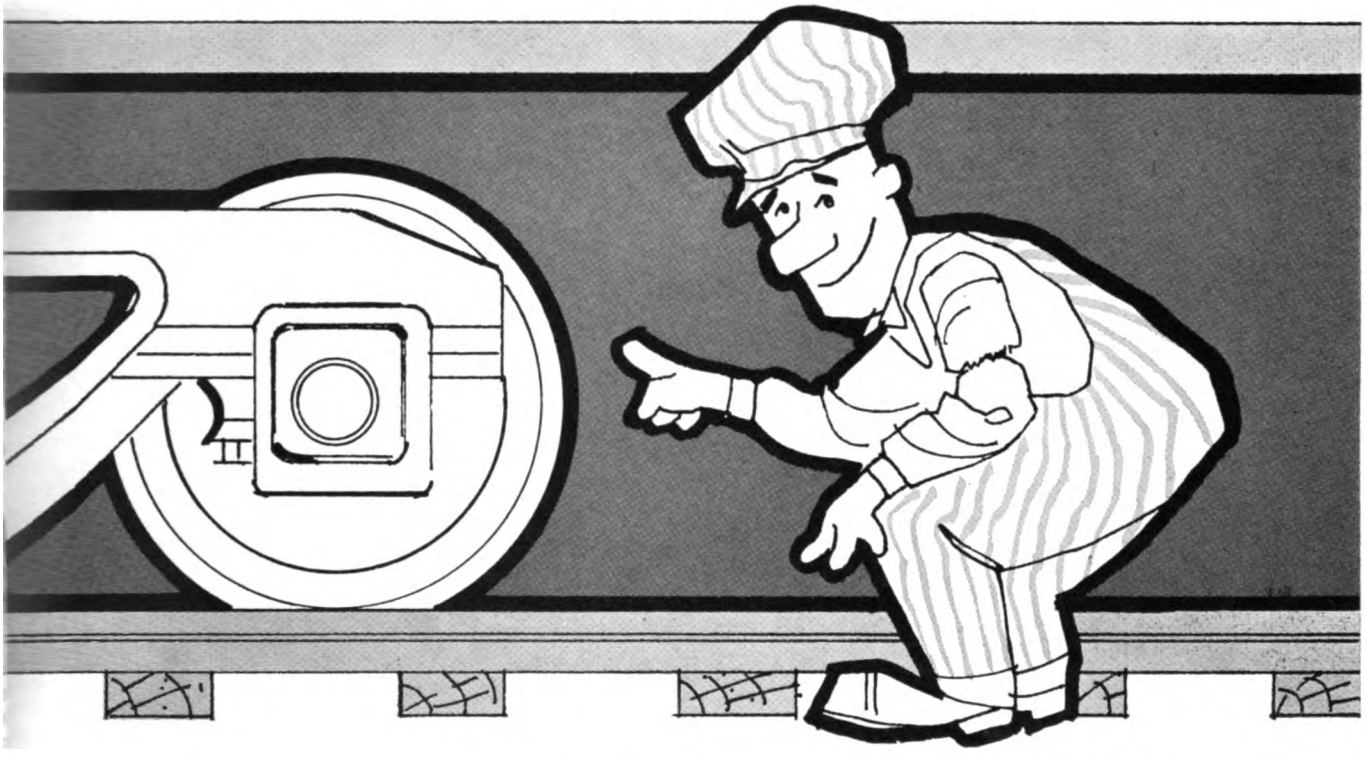
If additional locomotives are built, they would incorporate several minor design changes, and many features would be simplified. Mr. Garin said that it must be remembered that, in evaluating maintenance of components, it is necessary to compare the two 3-axle diesel-hydraulic power plants with a pair of 4-axle diesel-electric locomotives. It is a definite advantage to have each truck equipped with its individual propulsion system, he stated. Asked about the operation of units through high water, Mr. Garin explained that all axle-drive units are sealed and that there should be no restriction on such service. He commented on the smooth transition made by the hydraulic drives as they switch from one torque-converter range to another. Efficiency of the hydraulic transmission has been found to be about 82%—the same as that of the electric transmission used on diesel-electrics.

One American locomotive builder and several equipment manufacturers have expressed interest in possible construction of additional hydraulic locomotives and components. Higher horsepower in one carbody is an advantage and the coming motive power as the SP sees it. It means fewer units to operate, inspect and maintain.

Continued

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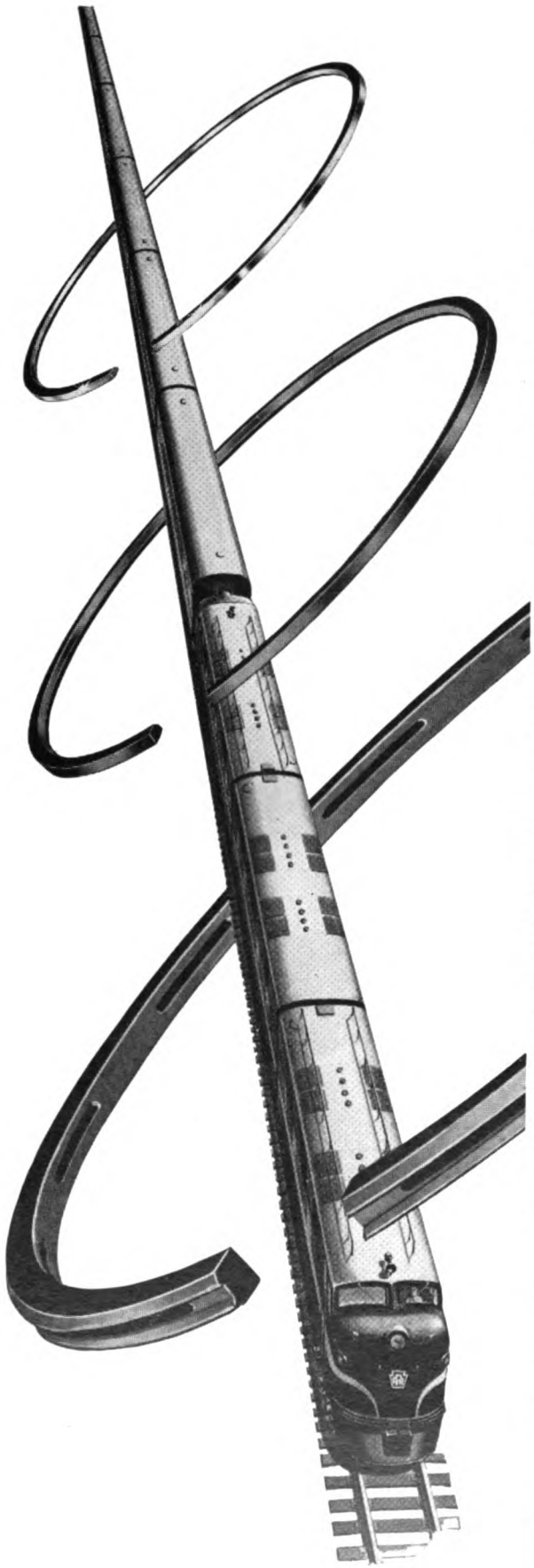


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ICC Concerned About Power Brake Law



R. Longhurst, ICC, cautions about observ- e of Power Brake Law's requirements.

'After more than four years, we consider t the educational phase of our work is er," H. R. Longhurst, assistant director the ICC Bureau of Safety and Service rned a joint meeting of the Air Brake sociation and the Car Department Offi- s Association while discussing the Power ake Law of 1958. The Power Brake Law, e other legislation, carries a penalty for ose who fail to comply with its require- nts.

"When and where brake tests must be ade and the manner in which each of them ist be made is spelled out in detail. Al- ough there has been some progress, much nains to be done. . . . Our observations train brake tests on freight trains indi- ed that 88.2% of the tests were properly ade and tests on passenger trains were .5% properly conducted. The sampling vered more than 6,000 tests.

"Some of the deficiencies which have been and:

- The initial terminal test is required to made at the point where a train is iginally made up. If afterward the consist this train is changed other than by adding removing a solid block of cars while the in brake system remains charged, the tial test is again required.
- An initial terminal test must be made ere a train is received in interchange. quirements and procedures for making test are specified in the 'Red Book' un- r Section 132.12, paragraphs (a) to (h).
- Maximum permissible brake-pipe leak- e is 5 psi. At initial terminal, piston travel body-mounted brake cylinders which is s than 7 in. or more than 9 in. must be justed to nominally 7 in.

"Many trains originate at points where rmen are not employed, or where there ay be no repair facilities. Many carriers el this gives them the right to haul de- ctive air brakes out of such points without repair or adjustment. Such thinking, however, is inconsistent with the rules which prescribe the specific procedures to be followed in the testing, inspecting, and repairing of train brakes during initial terminal tests and contain no provision for waiving or eliminating any of the specified requirements. Under certain specific conditions, some equipment having safety appliance defects may be hauled, only for the purpose of repair, without penalty. Our opinion is that improper piston travel must be adjusted 'at initial terminal.'

"Safety Appliance statistics indicate that air-brake defects have increased this year over last year. Units on which the air brakes were cut out or inoperative increased from 2,371 in 1961 to 3,435 in the year ended June 30, 1962—an increase of 44.9%. Units on which the brake-cylinder piston travel was excessive increased from 6,890 in 1961 to 8,709 in 1962—a 27.6% increase. The number of defects per thousand increased from 54.49 in 1961 to 64.24 in 1962 —a 14.2% increase. These figures reflect conditions which show the need for continued efforts toward improvement.

"Maintenance of proper brake-cylinder piston travel is really not the monstrous burden that some claim it to be. An excellent example of just how long a car on which the proper adjustment was made can be continued in service before it again requires piston-travel adjustment has been obtained through the cooperation of an Eastern railroad. A hopper car in captive service hauling coal has operated continuously since April 28, 1960. The replacement of worn brake shoes and wheels from time to time during this period has kept the piston travel within the prescribed limits.

"Adjusting piston travel at large terminals often can, and should, be minimized by making an inbound inspection after the brakes of the arriving train are applied in full-service application before the locomotive is detached. Cars on which piston travel is excessive can be marked to indicate the adjustment necessary, and this can be made either at that point or when the car is assembled in a train in the departure yard. It is a simple adjustment which can be made in a matter of minutes. If everyone does his share, it will very soon be reduced to a very minor problem.

"There appear to be some deficiencies in tests on transfer trains and yard train movements. On these, the requirements are that the air-brake hoses must be coupled between all units and, 'after the train brake system is charged to not less than 60 psi, a 15-psi service brake-pipe reduction must be made to determine that the brakes are applied on each car' before releasing and proceeding. The courts have interpreted this Section to require a visual inspection in the course of determining whether the brakes of each car apply. In some cases, our agents report these tests have been omitted and no brake application made. In other cases, we occasionally find that an application of the brakes is made but the brakes on the rear car only are inspected. Neither of these conditions meets the requirements.

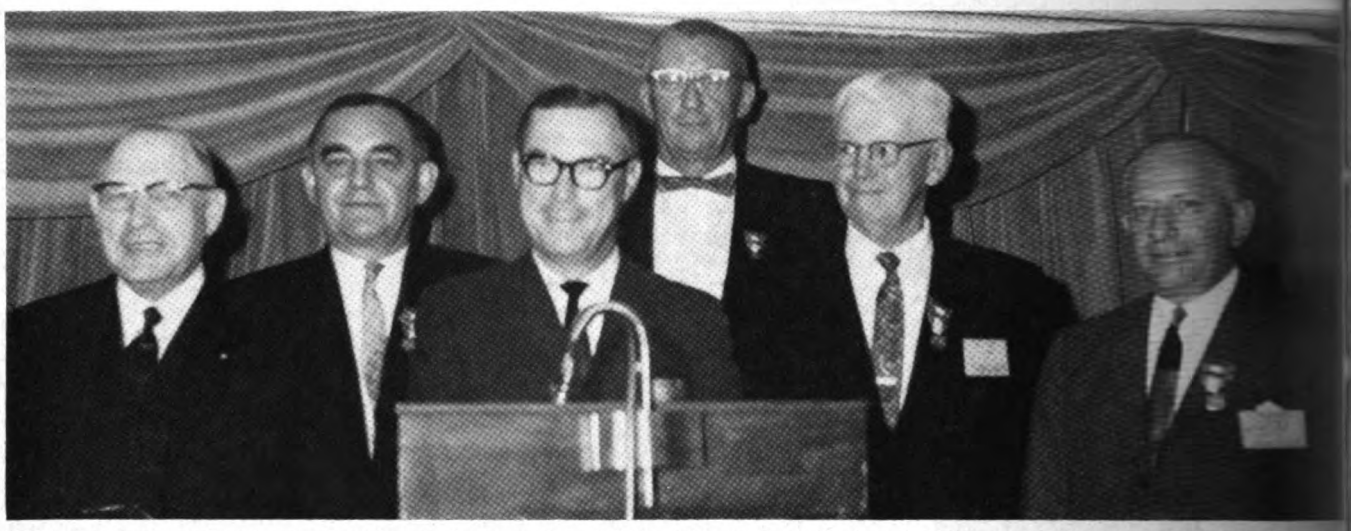
"There are some of the deficiencies in intermediate terminal train brake tests covered in Section 132.13 (d) (1) involving addition of a block of cars to a train. In some instances, the brakes of the cars added are inspected but no inspection is made of the brakes on the rear portion of the train. In other instances, the brakes of only a few of the cars in the block added are inspected. In still others, brakes on cars added are not inspected, but only brakes on the rear of the train.

"Shop and repair track practices have shown great improvements. During the year ended June 30, 1962, a total of 1,784 in-date test observations were made. Of this total, 187, or slightly more than 10%, were improperly made. For the same period in 1962, a total of 2,096 in-date test observations were made, of which only 124 tests were improperly made. Some repair tracks may still be releasing cars without performing the in-date test when it is due and required by law. There also have been instances in which the in-date test apparently was performed with a stencil brush. Sometimes on close examination of cars recently in-date tested or stencilled, we find loose control valves, worn brake shoes, loose brake pipes, defective angle cocks, and other deficiencies. In addition to being a violation of the law, there are other penalties for charges for work not performed. If the in-date test is carefully and thoroughly performed, many other problems would be greatly reduced or eliminated.

"It is a matter of grave concern that there is a continuing increase in the percentage of equipment having defective safety appliances. During the past two years, agents of the Bureau of Safety and Service in the field have inspected almost three million freight cars and 70,000 passenger cars. Freight cars having defective safety appliances increased from 5.1% in the year ended June 30, 1962, to 5.9% of the 1,416,-097 freight cars inspected in the year ended June 30, 1962. A few years ago we were concerned when this went above 3.5%. The over-all percentage may tend to obscure the fact, that, on some individual lines, the percentage of defective safety appliances is much higher. Defective safety appliances on passenger equipment increased from 4.9% in 1961 to 6.2% in 1962. All in all there appears to have been a serious deterioration in the condition. The record of safety appliance defects on locomotives is far better. In the year ended June 30, 1961, of the total of 111,516 locomotive units inspected for safety appliance defects, only 1.0% were found defective. This year, of a total of 110,007 locomotives inspected, 858, or 0.78%, had defective safety appliances."

Continued ▶

Coordinated Mechanical Associations



LMOA presidents, past and present, gather at closing session. Left to right are R. E. Harrison (retiring president), manager maintenance planning and control, Southern Pacific; W. E. Lehr (1960), superintendent motive power Lehigh Valley; C. A. Love (newly elected president), chief mechanical officer, Louisville & Nashville; G. E. Bennett (1950), vice-president and purchasing agent, Chicago & Eastern Illinois; F. R. Denner (1958), mechanical superintendent, New Orleans Union Passenger Terminal; T. T. Blickle (1956), general manager, Santa Fe. Mr. Blickle is chairman of the Committee of the Coordinated Associations.

Full-Flow Filtration Desirable for Diesel Locomotives

The full-flow system is giving better lubricating oil filtration than the conventional by-pass system, C. A. Wilson, general superintendent diesel engines, Santa Fe, and chairman, Fuel and Lube Oil Committee, told the Locomotive Maintenance Officers Association. Full-flow systems are highly desirable, he said, because they filter all the oil supplied to the engines.

Systems for full-flow filtration available at the present time use either pleated paper elements or a combination of pleated paper and waste-packed elements because of space limitations. The committee believes that any change in lubricating-oil filtration on present locomotives should give more complete removal of contaminants, increase filter life, and prevent fouling of the engine oil system with materials trapped in the filter system. Such a system should include full-flow filtration, more filter surface area which requires larger filter housings and an external by-pass arrangement. All these modifications can be made for about $675, or the external by-pass can be applied for $150 per unit. The committee believes the by-pass arrangement alone has considerable value but application of the entire system is the best approach.

The committee reviewed factors and methods used to determine oil cleanliness including ASTM precipitation number, viscosity, flashpoint, chromatographic methods, and dark-field microscopy (RL&C, June 1962, p 45). It said break-in filters are highly desirable, and pleated-paper elements in the regular filter housing are being used by many roads for this purpose. Satisfactory fuel-oil filtration on the diesel units requires, as a minimum, the use of large lube oil sock type elements and pleated-paper elements of the two micron size, according to the committee.

Other items covered by the report included wayside fuel-oil filtration, bacteria growth in fuel tanks and engine sparking. To eliminate sparking, the committee said it is essential to keep the engine in good mechanical condition. Three suggested modifications to eliminate or reduce sparking: spark arrestors, conformable oil rings, and needle-valve injectors. Use of the latter two, along with the application of the modified swirl-type exhaust manifold, is the most practicable way to eliminate sparking on EMD engines. Although these modifications appear costly, about $865.00 for a 16-cylinder engine, the fuel and lubricating oil savings alone will pay for them in a few years.

High-Horsepower Troubles

Increased horsepower output per cylinder has added to maintenance problems according to the Committee on Diesel Engine Maintenance headed by Chairman G. W. Niemeyer, mechanical superintendent, Missouri Pacific. Difficulties are experienced with turbochargers, piston ring breakage, valve blows, cracked heads, excessive vibration, fuel injection, cooling systems and exhaust manifolds on high-horsepower EMD and Alco engines. The General Electric U25B engine was discussed briefly but a more complete report will have to await next year after more experience has been obtained with this relatively new power plant. The committee said that close cooperation on the part of railroads and manufacturers will be required to develop methods for overcoming the maintenance problems caused by operating all these units at maximum horsepower ratings for extended periods of time.

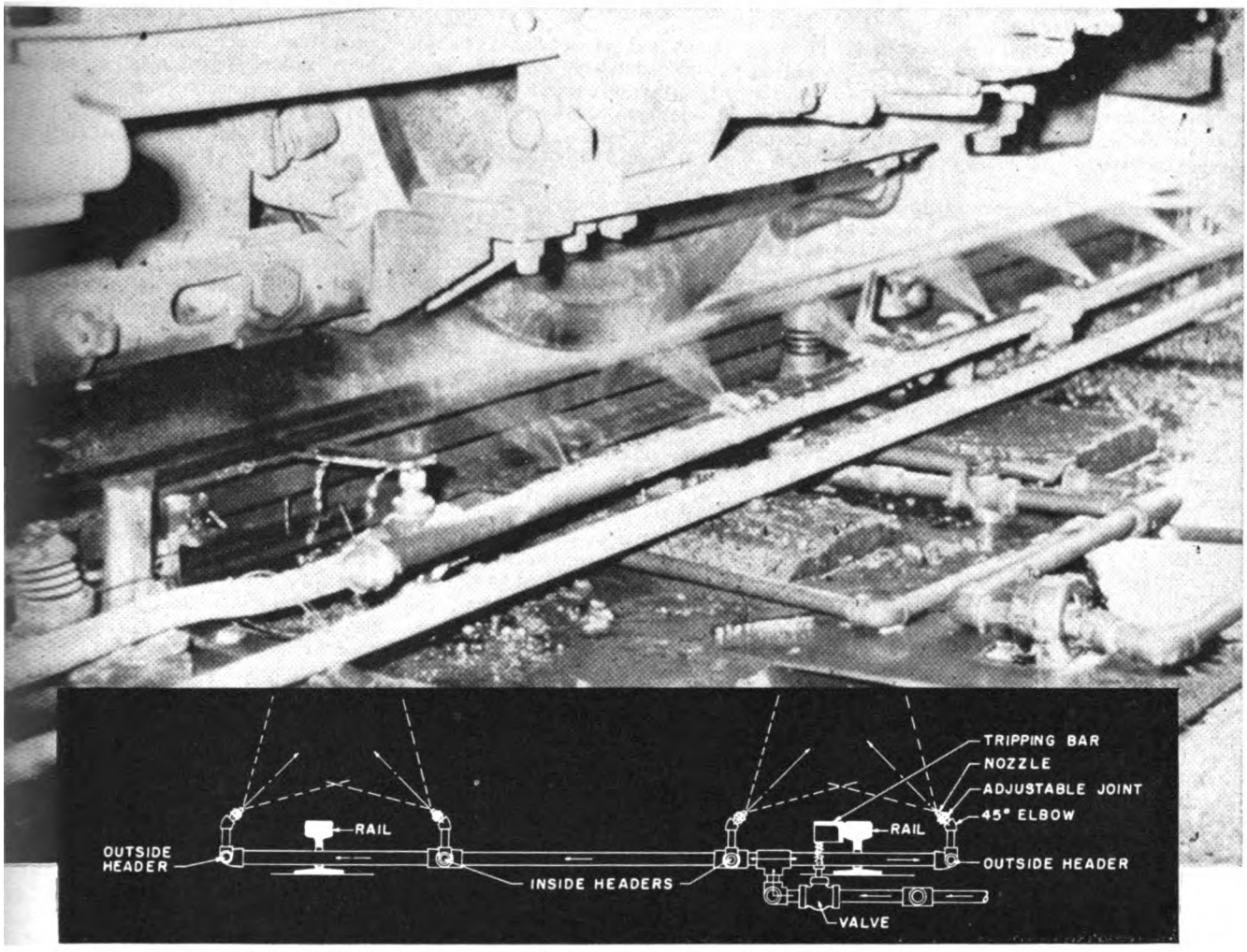
In the discussion an Alco representative said that vibration dampers have eliminated cam-shaft vibration on 12-cylinder engines and that changing the firing order greatly reduced the vibration in 16-cylinder engines. An EMD representative said vibration in their high-horsepower engines had been largely eliminated when critical speeds were by-passed.

S. C. Snow, superintendent motive power, Louisville & Nashville presented the report of the Shop Equipment Committee dealing with cost-cutting techniques of centralized repair operations and the difficulties experienced with these shops. The committee said that centralized repair shops must be made to work because the older methods have proved to entail exorbitant costs. Many of the problems involved in centralized operations result because personnel are not trained to operate a railroad with a single motive-power pool. Scheduling requires close liaison between the mechanical and transportation departments.

In discussing spot systems for locomotive maintenance the committee said that they are not the final answer, but are a step in the right direction toward work simplification. The report included a detailed explanation of the layout and operation of an existing spot-system shop. The committee said the value and success of this type of shop is dependent upon effort put into it to make it work, that it has one critical point. This is strict observance of the time schedule set up for the shop. If locomotives cannot be finished in the alloted time they must be set back.

Discussion of the report centered largely on trying to develop a measuring stick by which performance of spot systems could be compared. It was explained that no such comparison could be made because different shops do different work. Some of the ad-

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vantages of the system brought out in the discussion were: running repairs are done better and faster; cost and quality are more closely controlled; locomotive availability is increased and unnecessary work is avoided. It was pointed out that constant planning and close supervision are essential if the spot-system advantages are to be realized.

Economics of electrical maintenance were discussed by the committee headed by C. J. Frey, electrical department foreman, Rock Island. The report, presented by J. R. Mitchell, assistant electrical engineer equipment, Illinois Central, gave estimated values of labor time involved in electrical maintenance. In each case the report listed in detail the items covered. For trip maintenance, the labor time was 0.5 man hr per unit; for 7-day passenger and 15-day freight unit maintenance—1.32 man hr; for 30-day maintenance—2.99 man hr; for 30-day traction motor maintenance—0.67 man hr; for 30-day main generator maintenance—1.0 man hr (if rebrushed, an additional 0.75 man hr); for 30-day inspection on auxiliary generators and d-c traction motor blowers—0.25 man hr; for 30-day control cabinet inspection—0.25 man hr; for 30-day battery maintenance—0.5 man hr; for semi-annual inspection—1.91 man hr; for semi-annual calibration of switches—1.5 man hr; and for semi-annual isolation switch inspection—0.25 man hr. For annual inspection and maintenance the time is 6.0 man hr; annual lubrication for pneumatic cylinders on power contactors and reversers—1.25 man hr; annual check of pickup and drop-out of automatic transition, wheel-slip and ground relays—2.00 man hr; and annual check of traction motor support bearing and wick carriers—2.00 man hr. All the suggested electrical maintenance items were detailed along with the time allotment for each step.

The average traction motor changeout mileage, determined by the committee, is approximately 500,000 miles, although many motors fail and have to be removed before service is completed. On some roads traction motor repair costs are about $5.00 per 1,000 miles of service, not including cost of loss of service and labor required to remove and replace motors. Economical changeout period for main generators was suggested by the committee to be from six to eight years or from 750,000 to one million miles of service. One railroad submitted a generator repair cost of $2.20 per 1,000 miles, not including cost of loss of service or changeout expense.

In discussing a question on the relative merits of 19-plate and 25-plate storage batteries it was stated that 19-plate batteries are highly satisfactory. It was brought out that some roads have cut out the alternator-field resistor on EMD units so equipped because the heat developed damaged insulation. This change has reduced the damage. The increase of 20 volts which results has in no way proved detrimental. As a matter of fact, it improves blower-motor starting characteristics. The B&O has removed this resistor from F3 and F7 locomotives.

Both steam and vapor degreasing for cleaning of insulation were classed as being satisfactory with the choice being determined by the type of insulation being cleaned. There was no disagreement to the statement that parts in the degreaser not more than 5 to 7 minutes would be harmed. It was generally agreed that a percentage of insulation failures are caused by vibration. Replacement of spring suspensions with rubber-cushioned [illegible] has effectively reduced damaging vibration and motor failures. One road has [illegible] 1,000 sets.

Wheel Shop Practices Should Change

Some axle finishing practices should be altered to suit today's conditions, the CDOA Committee on Wheels, Axles and Wheel Shop Practices reported. Commenting on Rule 1.15 in the AAR Mechanical Division's Wheel and Axle Manual, the Committee recommended that it be changed to require ½ in. taper on all axles. The Rule now reads: "A taper must be turned on the outer end of the wheel seat extending a maximum of ¼ in. for 5½- x 10-in. axles or smaller, and a maximum of ½ in. on larger axles. This taper shall be started at $\frac{1}{32}$ in. less than the wheel-seat diameter and is intended to insure true entry of the axle into the wheel bore." The Committee pointed out that the ¼-in. taper was originally set for cast-iron wheels. Because the days of the cast-iron wheel are numbered and because of complaints that the cast-steel, or the wrought-steel, wheels tend to cock on the short taper, a longer one is recommended.

Diagrams of the freight-car and passenger-car axles show for both axles a radius of ¾ in. between the journal and the dust-guard. On the standard AAR freight-car axle, the radius between the dust guard and wheel seat is ¾ in., but on the passenger axle the radius between the dust guard and wheel seat is 1 in. It was recommended that all the radii be specified as ¾ in. because the ¾ in. radius would serve equally well on both types of axles. When turning a passenger axle with a shaped tool it is necessary to change tools after making one radius before going to the other. In the case of automated lathes, a completely different template is required, resulting in delay and expense in changing templates. Further, it was suggested that a small plus or minus tolerance be included in the ¾-in. radius specification. As it now reads, the radius must be exactly ¾ in. A small tolerance would not affect operation or service of the axle under a car and would facilitate machine shop work.

The method recommended for mounting the indicator when checking the boring mill in accordance with Rule 1.22 on page 12 is shown on page 48 of the Wheel and Axle Manual. The Committee recommended that the indicator be mounted on the hub facing ram or on some other portion of the machine where it would be somewhat easier to attach while giving a reading no less accurate.

The Committee on Car Lubrication has asked that steps be taken to improve the finish of axle end collars which are said to be damaging lubricators. One of the major causes for scrapping lubricators, said the Committee, is end wear, caused mainly by rough collars on the journals, [illegible] which have been previously damaged by waste retainer springs.

Wheel and Axle Manual Rule 1.1[illegible] in part: "Journals, journal fillets, dust guard seats and end collars must be finished smooth and must be rolled. When journal diameter is reduced ¼ in. or more, the horizontal surface of the end collar must be turned and rolled to restore the original difference in diameter between journal and collar as when new." Rule 1.10 states: "Files must not be used to break the sharp edges of the end collar and the dust guard seat." The Committee recommended that the rule be altered to read that the sharp edge of the collar should be removed with a radius applied, and the collar filed to a smooth finish. It is necessary that the full protection given the journal also be given the collars in the handling of wheels from the wheel shop and during installation in the truck. These practices would greatly reduce the number of pads damaged by worn collars, the Committee said.

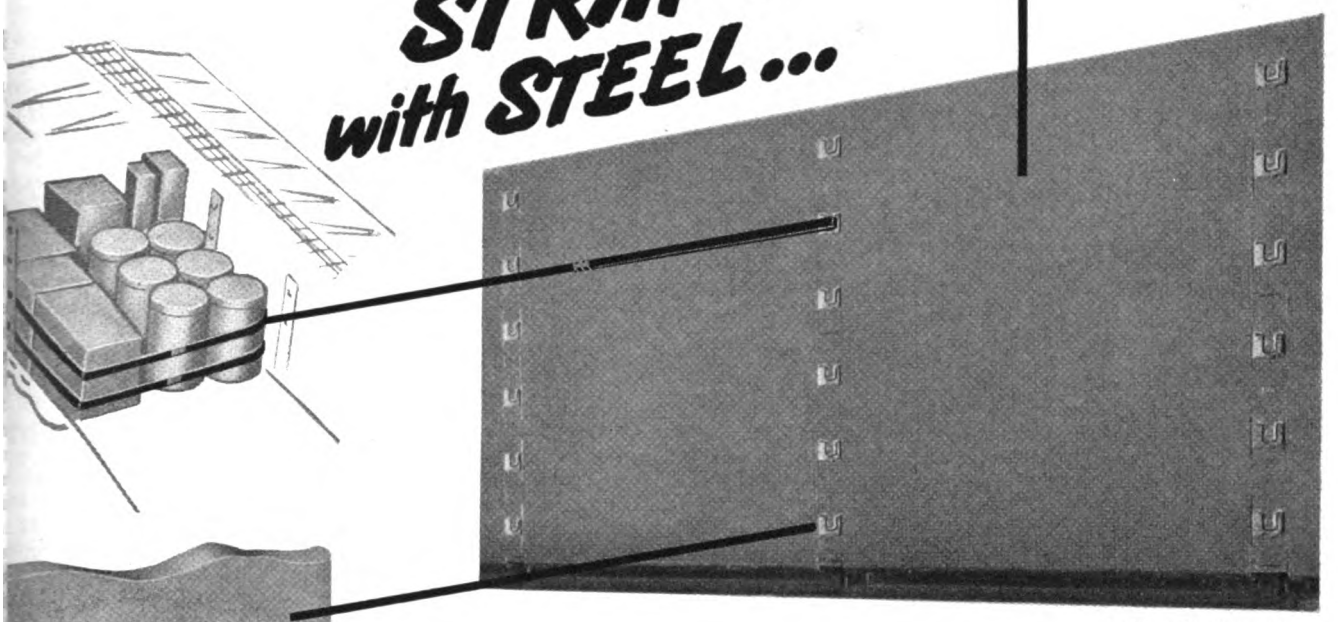
There are several truck conditions directly related to journal-bearing performance, the Committee on Car Lubrication continued. Most prevalent now is the undesirable springing found on some cars. Some trucks are found to have broken springs, or springs which are weak and have permanent set. Uneven or excessive [illegible]ming is found under springs. These conditions must receive proper attention particularly with the 5% increase in car limits (RL&C, July 1962, p 23).

There are also cars operating with excessive wear at the bolster guide arms, frame columns, and with ineffective or missing stabilizing members. These conditions cause excessive end wear on journals and were a contributing factor to difficulties experienced with the "H" plain bearing. A restriction in the swiveling of the truck causes uneven bearing of the journals and additional wear. Center-plate lubrication is now investigated by the AAR Lubrication Committee (see p 29). The dry center situation may become more acute, longer periods to be expected between wheel changes as cast-iron wheels are eliminated and by the decrease in the number of wheel changes resulting from [illegible]rnals as the hot-box record improves. Another contributing factor is the large number of cars with tight side bearings caused by weak or broken body bolsters.

Contin[illegible]

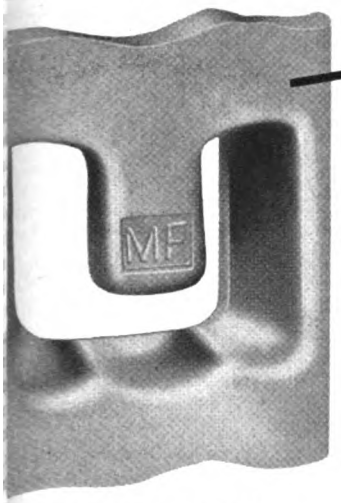
WRAP it in STEEL,

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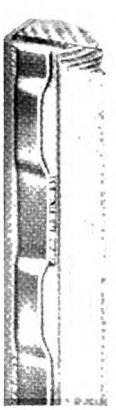


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Santa Fe men headed both the ABA and CDOA. CDOA president was H. L. Price, mechanical assistant-car (left); ABA president, T. H. Bickerstaff, general supervisor air brakes.

Modified 24-RL Brake Has 26-L Features

The benefits of brake-pipe pressure maintaining can be obtained on locomotives with the 24-RL brake system by replacing certain brake equipment components with those of Schedule 26-L. The changes, which also have other advantages, were detailed for the Air Brake Association by the Montreal Air Brake Club. Basically, this is done by using a 26-C brake valve in place of the 24-RL brake valve rather than converting it to DS-24-MC type.

The brake-pipe pressure maintaining feature was made available for incorporation in the 24-RL equipment in 1954. U.S. and Canadian railways made numerous applications to existing equipment, converting the DS-24 brake valve to the DS-24-MC type by substitution of a filling piece. This conversion involves considerable expense and does not achieve the lower maintenance savings which are now possible. If the locomotive is subsequently equipped with a complete 26-L system, another piece of expensive equipment, the filling piece, becomes surplus; its only value would be as stock for any 24-RL equipped locomotives.

Most locomotives built since 1958 are equipped with the 26-L brake equipment which includes pressure maintaining as an integral feature.

Compact design, lower initial cost, and reduced maintenance requirements have established the 26-L brake as much superior to other locomotive brake equipment. Its versality is substantiated by applications to automated trains. Design characteristics enabled 26-L equipment to give trouble-free, low-maintenance operation. A paper presented to the ABA in 1959 entitled "26-L Locomotive Brake Equipment, Characteristics of Operation and Maintenance" established that the time required for cleaning, repairing, and testing was reduced approximately 50% as compared with similar 24-RL components and approximately 20% when compared with 6-SL or 6-BL components.

The material required for installing a 26-C brake valve on a 24-RL locomotive having safety control, overspeed control, and m-u details, includes one 26-C Brake Valve with a 220-cu in. Equalizing Reservoir, one P-2-A Application Valve, and one H-5-A Relayair valve. These replace the complete DS-24 automatic brake valve while providing for all existing features excepting a split reduction of a penalty application. This feature is described in a second conversion method.

In the first, a ⅜-in. check valve, located in the pipe between the P-2-A Application Valve and Brake Valve Port 8, prevents air flow from the brake valve. A second ⅜-in. check valve placed between Port 11 of the H-5-A Relayair valve and Port 53 of the brake valve prevents air flow from the brake valve to the H-5-A Relayair valve when the brake valve is in Cut-Out position. A 24-A double check valve between Port 25 of the P-2-A Application Valve and Port 12 of the brake valve provides power knockout during safety control or emergency applications initiated by the brake valve.

When a penalty application occurs, there is a direct exhaust of equalizing reservoir air throught Port 24 of the P-2-A Application Valve. This scheme simplifies the conversion by using the remaining 24-RL equipment as it was originally installed. There are only eight pipes to be coupled between existing components and the added 26-L equipment. The split-reduction feature has not been incorporated in many 26-L equipped locomotives purchased by some railroads. Need for it has decreased since all freight cars are equipped with AB valves which provide twice the propagation rate of K triple valves.

The second method of conversion provides additional equipment which gives a split reduction of a penalty application. It includes an A-2 Reduction Selector Valve, a 180-cu in. First Suppression Reservoir, a 3½-in. Single Pointer air gage, an H-5-A Relayair valve, and a 24-A double check valve. Only eleven pipes have to be coupled from existing components.

During a penalty application, the exhaust of equalizing reservoir air which is the second part of the split reduction will continue until the brake-valve handle is moved to suppression position. Adding the equipment to provide the split reduction eliminates the need for the overspeed-application valve, overspeed-suppression valve, and the cut-out valve on the HA-24-A Relayair valve unit. Removal of these three valves and addition of the specified blanking pad changes the designation of the Relayair valve to "HA-24-J." The safety control pedal is moved to Port 3 of the P-2-A Application Valve. The overspeed magnet valve is connected to Port 42 of the A-2 Reduction Selector Valve through an H-5-A Relayair valve.

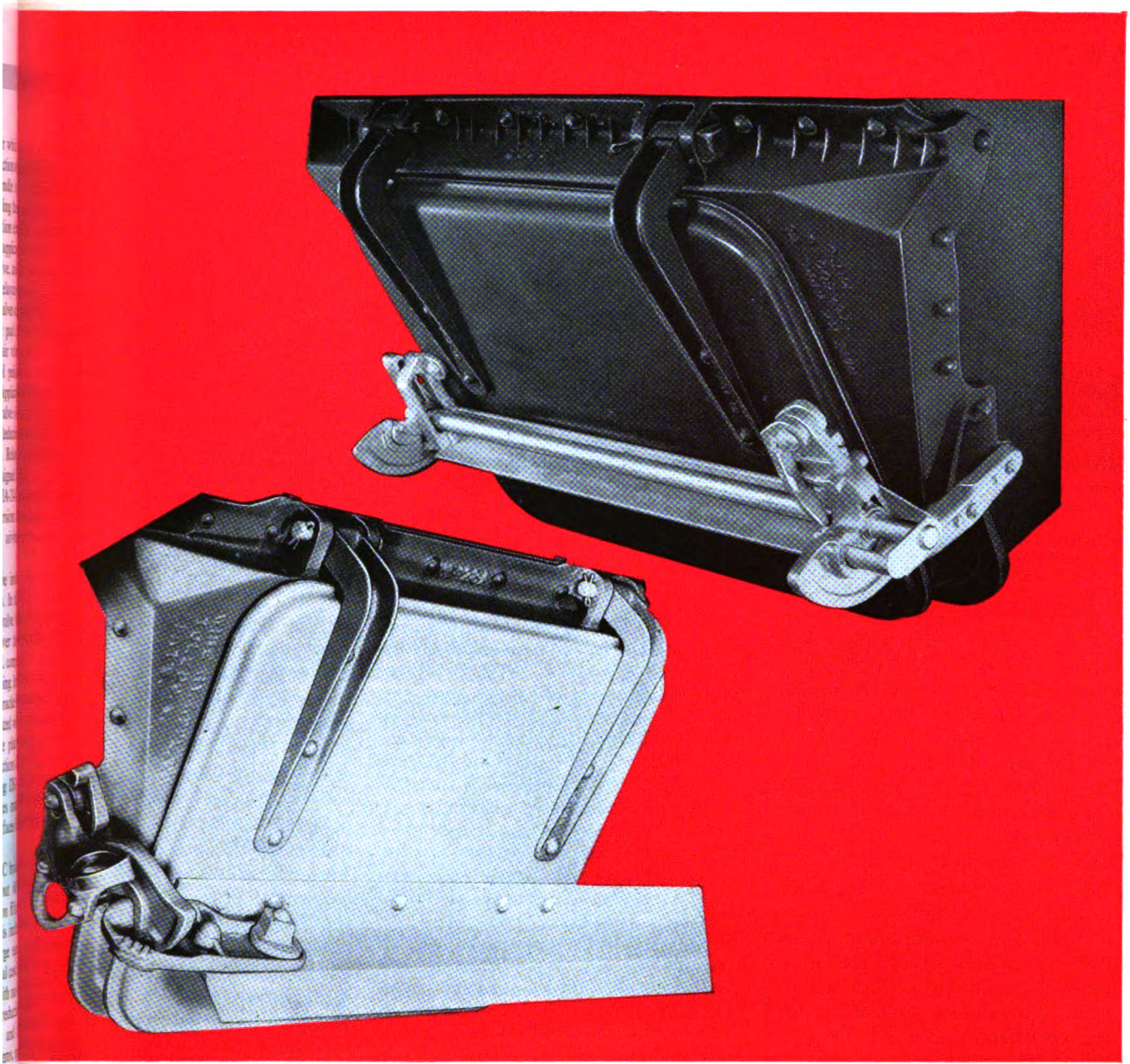
Both methods are designed for 24-RL equipment having an HA-24-C Relayair valve unit. These conversions have been thoroughly tested by an air-brake manufacturer.

This equipment can be installed on a locomotive in three ways. In the first, the complete DS-24 brake valve is removed and a stand provided over the cab-floor opening to house the 24-L components and to couple into existing piping. In the second method, the DS-24 pipe bracket is retained, the D-24 feed valve replaced with a blanking plate, and a suitable plate manufactured with flanged connections for mounting on top of the existing DS-24 bracket. The third method requires manufacturing a pedestal with mounting faces for all 26-L components.

Cost of installing a 26-C brake valve on 24-RL equipment is about 60% greater than applying a conversion filling piece to a DS-24 brake valve. This includes an installation allowance charge equivalent to 10% of the overall material cost. The initial cost increases to 100% with no installation allowances with the split-reduction feature.

The 26-C brake valve and other 26-L components have diaphragms, spool valves with "O" ring seals, and cam-operated poppet valves instead of ring-type pistons and lap-fitted slide valves. Reduction in maintenance cost of the 26-L equipment is reflected in a comparison of repair costs of the DS-24-MC and the modified 24-RL schedule with 26-L components. The latter, without split reduction, can be maintained with a 35% savings per periodic change. One man can change this equipment in half the time it takes two men to change the DS-24-MC valve, the latter weighing seven times as much as the 38-lb 26-C brake valve.

The 26-C brake valve requires no special instructions to cover pressure maintaining operation. Such instructions are required with DS-24-MC-equipped units. The feature is always available as long as the brake valve is used; it cannot be inadvertently cut out. Train handling has been considerably simplified with the self-lapping brake valve and its Minimum Reduction position, which may be used with the service zone to provide slack control excelling that afforded by First Service position on 24-RL. Use of the 26-C brake valve with 24-RL equipment provides a flexible brake with many of the advantages of 26-L equipment.

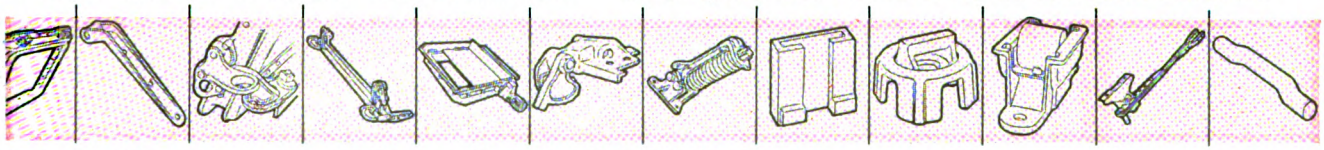


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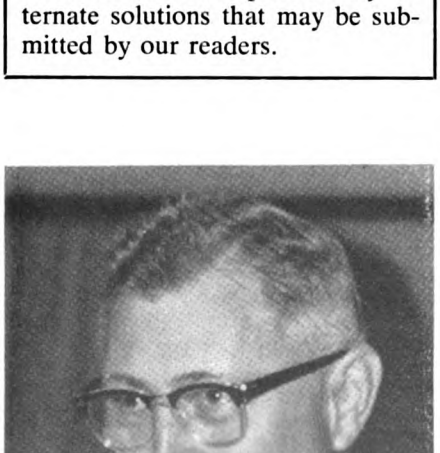
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What Is Your Problem?



LMOA Panel responsible for answers (left to right): S. C. Snow, superintendent motive power, Louisville & Nashville *(LMOA Shop Equipment C mittee)*; K. L. Pollitt, manager systems assembly shops, Southern *(Diesel Material Inventory and Control)*; C. A. Wilson, general supervisor engines, Sante Fe *(Fuel and Lube Oil)*; C. J. Frey, electrical department foreman, Rock Island *(Diesel Electric Maintenance)*; C. W. Nie mechanical superintendent, Missouri Pacific *(Diesel Engine Maintenance)*; T. W. Bellhouse, superintendent mechanical department, Cotto *(Diesel Mechanical Maintenance)*; W. F. Dadd, general superintendent motive power, Baltimore & Ohio *(New Developments in Motive P Maintenance)*.

The Locomotive Maintenance Officers Association had a Problem and Solution session at its annual meeting—as a new service to the railroad industry and the LMOA membership. Solutions offered by the LMOA are practical ways to solve current locomotive problems; they are not submitted as the *only* solutions. Because we believe the solutions are of interest and value to all railroads, Railway Locomotives and Cars is publishing, in this and subsequent issues, the solutions prepared by LMOA members. We will also publish any alternate solutions that may be submitted by our readers.



J. J. Dwyer, chief chemist, Chesapeake & Ohio, served as chairman of "What Is Your Problem" panel at the recent annual meeting in Chicago.

The Diesel Engine Maintenance Committee, in its presentation on page 68 of LMOA 1962 Pre-Convention Report, observes that one of the most noticeable defects in the new EMD high-horsepower locomotives is excessive engine vibration in No. 2 and No. 5 throttle positions with the old governor settings. New governor settings have been recommended so that engine speeds will not coincide with critical vibration ranges of the locomotive. However, operation of these high-horsepower engines at critical speeds has pointed out other defects in locomotive components. One such defect has been in the D12-14 and D22-14 main generators supplied in early model GP-9 and GP-18 locomotives. Several generators have failed after 250,000 to 500,000 miles of service, evidenced by melting of solder from one leg of the compensating conductor circuit. The overheating of this circuit resulted when all of the generator current passed through the one leg. Cause of the failure was a fracture of the top interpole coil lead resulting from vibration. Improper support of the interpole-to-interpole top lead connector allowed vibrations to be amplified, resulting in premature failure.

All interpole leads are to be snubbed with neoprene rubber blocks. On the cross-connected interpole coils, the snubbing is to be applied between the top and bottom interpole coil leads and will require six EMD 8292301 blocks . . . On the open-connected interpole coils, the snubbing block i be applied between each interpole c nector and the adjacent starting f lead. This will require six neopr blocks, 1¼ x 1⅜ x 1¾ in., and blocks, 1¼ x 1½ x 2 in. This mat al can be cut from six EMD 8223 support blocks. Each compensat field coil connector is to be snub to its adjacent compensating field c This will require six EMD 8292 blocks. If necessary, each connec should be bent slightly to insure a c pression fit between the connect Each snubber should be tied w three turns of 0.010 x 1-in. fiber-gl tape, the loops being pulled tight tied and painted with Glyptal N 1201.

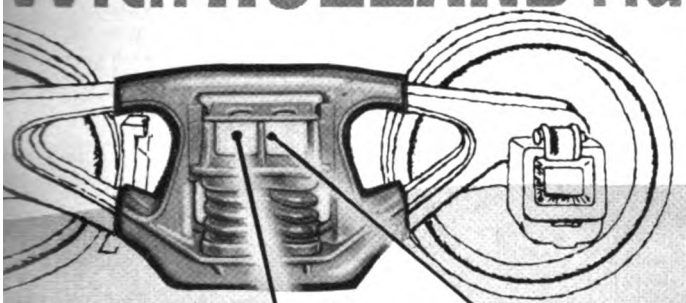
To control the vibration and red conductor fracture on units in serv the six cross-connected interpole c can be snubbed without removing D22B-D14 generator. This can done by wedging an EMD 8292 snubber between each cross-connec at the bottoms of coils 1, 2, 4, 6 and 11. Each of these coils can reached to apply fiber glass. It sho be realized that some of the D22 in pole leads now in service are alre cracked but have not opened c pletely. Snubbing a defective coil l can only control vibration but can correct the existing defect. All ma tenance men should watch for mel solder in D22 and D12 main gen tor compensating field connect Any sign of melted solder shoul cause for immediate removal of t generator for repairs. Failure to

all these CAR TRUCKS should be MODERNIZED with HOLLAND ride stabilizers RS-2

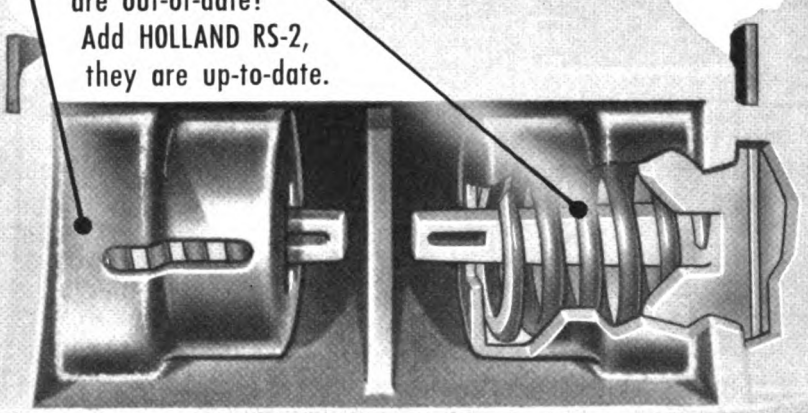
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this will result in loss of the armature winding from overheating.

C. J. Frey, electrical department foreman, Rock Island.

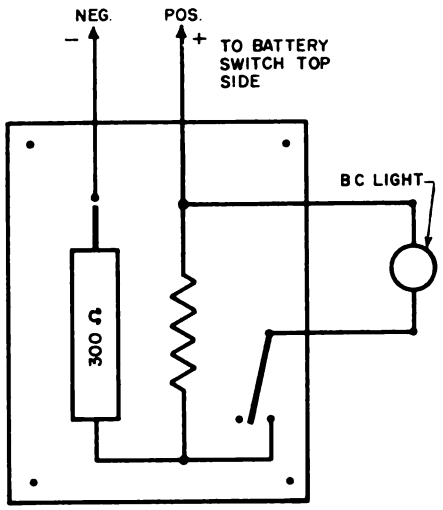
Flashover damage to EMD D12 and D22 main generators has been experienced at the compensating field coil jumper connectors of the No. 6 main field coil adjacent to the commutator. Arc path is from the connector risers next to the positive brush holder which is on the center line of the No. 6 main field coil. Because the flashover circuit at this point does not include any part of the grounded circuit, continuing flashover currents can be maintained. Can this be controlled or eliminated?

Because of the location of this arc circuit, it was suspected that only accumulations of ionized gases would cause the air-gap breakdown between the positive armature risers and the negative compensating field coil. It was also noted that all generator cooling air enters at the top right-hand side of the generator and circulates counterclockwise around the commutator, arriving at the top of the generator with low pressure and velocity and probably partially ionized. To avoid this ionization and give the generator a more uniform air distribution system, the air flow was divided to send half of the cooling air in a clockwise and half in a counterclockwise direction around the commutator. By inserting a baffle in the outlet of the generator blower, half of its output is forced over the top of the commutator. This modification has resulted in a more uniform air flow through the generator and, it is hoped, will also raise the flashover voltage of the generator at the No. 6 pole. Results are inconclusive because only three generators, so converted, are under test.

C. J. Frey, electrical department foreman, Rock Island.

How do you make sure the engineman on a diesel locomotive is aware that batteries are being discharged before a complete battery failure occurs?

A warning light actuated by a voltage sensitive relay can be installed in the cab. The relay, connected across the battery terminals, is set to drop out at 68 volts. The light, identified as the "BC" (battery charging) light and



Contact lights Battery Charging Lamp.

placed in the instrument panel at the control stand, is illuminated at all times that 68 volts or more exist across the battery terminals.

G. F. Bachman, chief mechanical officer, Elgin, Joliet & Eastern.

Are present automatic refueling systems practical?

Present automatic refueling systems are, in general, practical. Like all conversions, there arise some problems of interchangeability between the systems of the various manufacturers. In fueling diesel units that have one type of equipment and fuel stations having another type of fueling nozzle, the use of adapters will, in most cases, solve the problem. The savings produced by elimination of fuel spillage with automatic fueling systems amounts to thousands of dollars annually. Most railroads have already installed automatic systems.

K. Pruchnicki, supervisor locomotive maintenance, Southern Pacific.

Do stainless-steel exhaust manifolds prove to be an economical installation on Alco locomotives?

One of two Hanlon & Wilson 12-cylinder stainless-steel manifolds on test was removed recently because of a crack in one of the bellows. These manifolds, originally costing approximately $2,000, had 4 years, 9 months service. Repairs to the one removed will cost $500, making anticipated annual cost for the stainless-steel manifold approximately $400.

Over a 16-month period repairs were made to 110 standard Alco 2[illegible] manifolds. The following were [illegible] in these repairs:

Part and Part No.	Number used	Tot[illegible] cost
Elbow (2281573)	144	$3,81[illegible]
Lock plate (2154132)	2,400	60[illegible]
Gasket (2153654)	1,300	52[illegible]
Gasket set (2155474)	124	18[illegible]
Clamp (2155222)	745	82[illegible]
Clamp (2281366)	120	2[illegible]
Cap screw (2155362)	2,031	1,15[illegible]
Housing (2281611)	74	6,65[illegible]
Pipe (2281606)	69	69[illegible]
Pipe (2281605)	67	94[illegible]
Pipe (2281607)	58	2,92[illegible]
Pipe (2281608)	65	3,39[illegible]
Tee (2281581)	321	10,13[illegible]
Tee (2281592)	100	3,88[illegible]
Material and parts (not carried in regular stock) manufactured by shop		2,00[illegible]
Total		$37,7[illegible]
Average material cost per month		$2,36[illegible]
Direct labor use in dismantling, cleaning, inspecting, and reassembling manifolds, per year		$6,25[illegible]
Average number of manifolds per month on classified repairs for 16 months		[illegible]

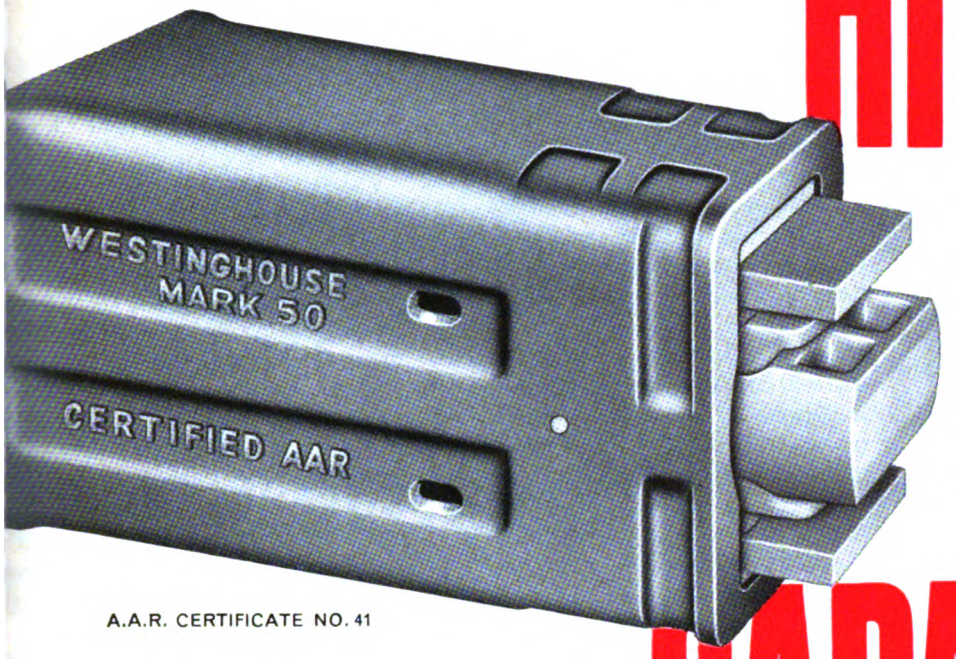
In addition to the requirements [illegible] classified repairs, based on the a[illegible] age and taking into consideration [illegible] Alco units set up on a 24-month per[illegible] between classified repairs, an aver[illegible] of 1/24 of 165, or approximately s[illegible] manifolds per month, would be [illegible] quired to be changed out on 24-m[illegible] classified repairs. Records during [illegible] period of 16 months reveal that [illegible] manifolds have been repaired by s[illegible] forces—an average of approximat[illegible] 7 per month, of which 4.5 were u[illegible] on classified repairs.

Cost of the standard manifold le[illegible] off at about $400 per year, the s[illegible] as that for the stainless-steel [illegible] An advantage of the stainless-[illegible] manifold is improved locomotive [illegible] formance. There appears to be [illegible] in the substitution of the stainless-[illegible] manifold for the standard type w[illegible] the locomotive units are expected [illegible] continue in service for five years f[illegible] the date applied.

C. A. Love, chief mechanical [illegible] ficer, Louisville & Nashville.

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Static Controls for Dynamic Diesels

By Gordon Taylor

"Static controls for dynamic diesels" were the words used by Doc Watts to begin his description of the control system of the Electro-Motive GP-30 locomotive. Doc had just returned from the factory where he had received instruction in the control and power systems of these 2,250-hp units, some of which were soon to be delivered to his railroad. He was enthused about what he had seen and learned. With wiring prints he was now explaining their control systems to the maintainers at Centerville diesel shop.

"In the past," he said, "we have all become familiar with control devices of the electro-mechanical type —magnetic power contactors, relays, magnet valves, and motor-driven rheostats. Control-system designers now have available to them a whole series of new control devices. These are the so-called static devices which can be used in place of electro-mechanical components. It is the control of tomorrow that we must start learning about today.

"First, what is a static component? The answer is simple. A static component has no moving parts. Batteries, transformers, thermocouples, vacuum tubes, magnetic amplifiers, and semiconductors all are without moving parts—thus are classified as static components. The last two, magnetic amplifiers and semiconductors, are most important in our study of GP-30 controls.

"Magnetic amplifiers and semiconductors are small, require relatively little power for operation, and generate little heat. These two types of components have put the term 'static' into the electrical control field to stay. Static controls require little or no maintenance. When once properly adjusted at the factory, they retain their settings for extended periods. We will undoubtedly hear still more about static control devices as new models of diesel locomotives are developed. Before we start to trace the working of static type controls on the GP-30, perhaps we should consider the nature of these devices.

"A magnetic amplifier is a saturable core reactor consisting of a three-leg iron core with a-c windings on the two outer legs and d-c coils on the middle leg forming a control winding. The effective inductance of an iron core coil will vary as its magnetic saturation is changed. If an a-c winding is placed on such a reactor, the strength of alternating current in that coil may be regulated by varying the direct current in the control coil or coils. We can define a magnetic amplifier as a device using saturable core reactors alone, or in combination with other circuit elements, to control the a-c output current. These devices are amplifiers because the regulation of relatively low currents in d-c control windings gives control over much larger currents in the a-c output windings. Remember, an amplifier does not generate or magnify power. The d-c input signal simply controls the a-c output signal.

"We will now discuss semiconductors which we mentioned earlier as being important components of static control systems. First, what is a semiconductor? There are three general classes of electrical materials:

- Conductors, such as aluminum, copper, and silver, which transmit electricity very well;
- Insulators, such as glass, rubber, and porcelain, which transmit electricity very poorly or not at all;
- Semiconductors, such as silicon, selenium, and germanium, which transmit electricity better than insulators, but not as well as conductors.

"In its basic form a semiconductor is not very useful for electrical purposes because it is a poor insulator as well as a poor conductor. However, a semiconductor material, properly treated and prepared, becomes electrically useful because it can be given the ability to block the flow of current in one direction while permitting it to flow freely in the opposite direction. In an electric circuit it is comparable to a check valve in a water pipe. This makes it useful as a rectifier of alternating current for battery charging for other purposes requiring direct current.

"Semiconductors are very reliable. They last longer than electro-mechanical components because they have no moving parts, requiring much less maintenance. Semiconductors have another advantage. They respond much faster than electro-mechanical components. Time delay of semiconductors is a few millionths of a second compared to a few tenths of a second for an electro-mechanical component.

"The rectifiers used in connection with the battery field excitation reactors on the GP-30 locomotive are of the silicon type. We shall see that they fill a very important function.

"The electrical control system of the GP-30 can be divided into three principal parts:

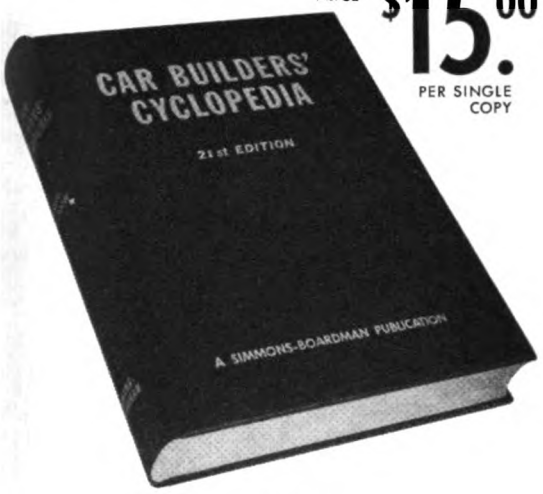
- Means of providing static main generator excitation, the source of excitation current being the alternator
- A programming switch for making traction-motor connections during transition.
- A dual-purpose feedback power control that teams with the load regulator to keep the diesel engine working at maximum efficiency, at all times, protecting the main generator and traction motors against damaging overloads.

"To take care of the first need, the static excitation system for the D2 main generator utilizes a magnetic amplifier to regulate the current to the generator's separately excited field. This field is still known as the B or Battery Field, although the exciting current is furnished from the D2 alternator after having been rectified by silicon rectifiers on its way to the field circuit. The magnetic amplifier that regulates current to the battery field is made up of three reactors—FM1, FM2, and FM3. These three reactors, together with a three-phase rectifier, function to control and rectify the flow of three-phase alternating current to the main generator's battery field.

(Continued on page 49)

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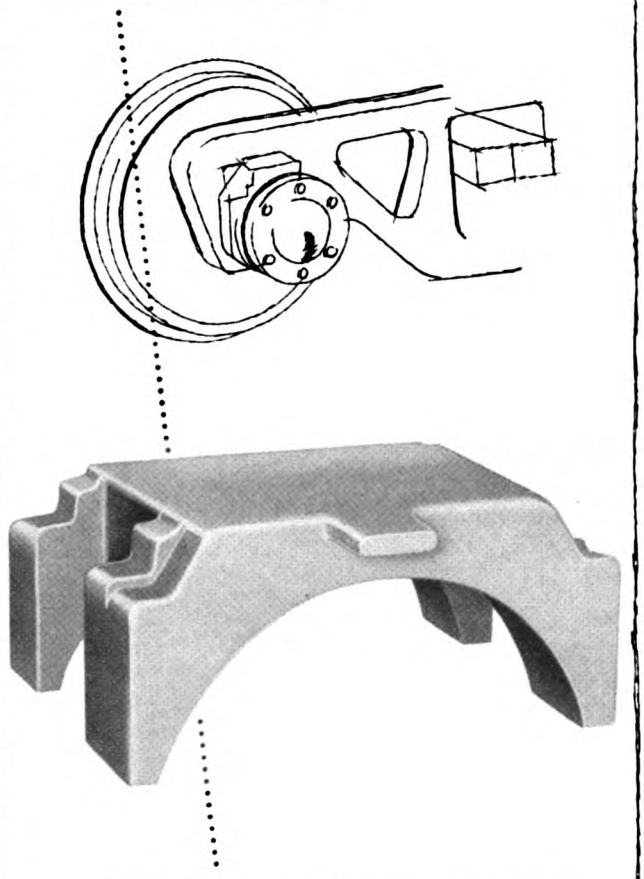
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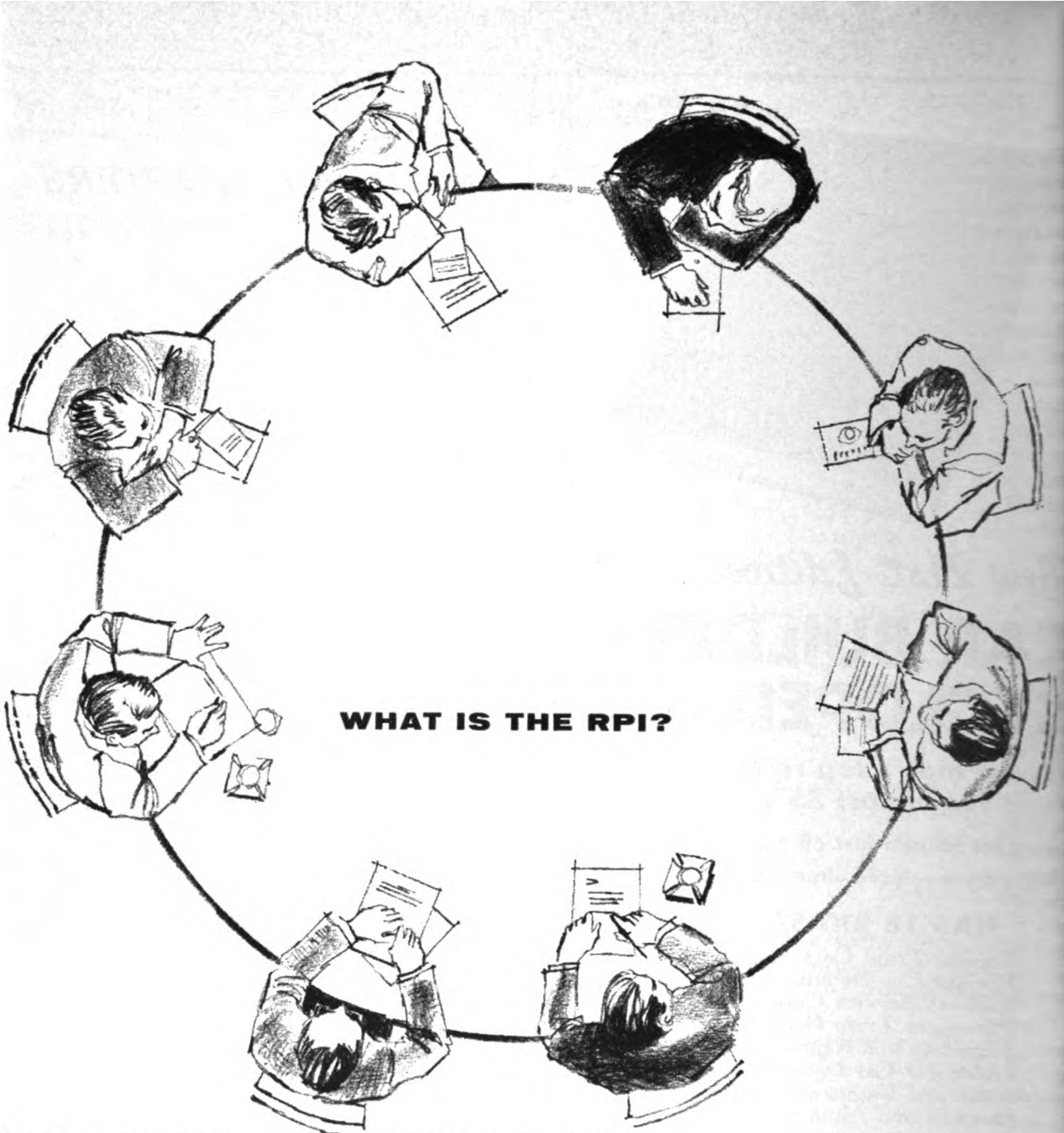
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This, then, is the best way to answer the question in the headline.

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Behind this insignia is an "RPI railway supply man."

389

(Continued from page 46)

You will recall that on the older s d-c for the B field comes from auxiliary generator through a large vy-duty rheostat operated by the l regulator which is powered by a raulic vane-type motor actuated n engine lube-oil system. In the v system, the load regulator is a -contained unit, consisting of a ll hydraulic vane-type motor that ves a small 3-in. rheostat. This ostat does not handle the battery- d current directly, as did the old vy-duty rheostat; it just handles a all current, a fraction of an ampere, control the magnetic amplifier. As the older units, engine-oil pressure sed to move the vane motor to vary position of the rheostat brush arm.

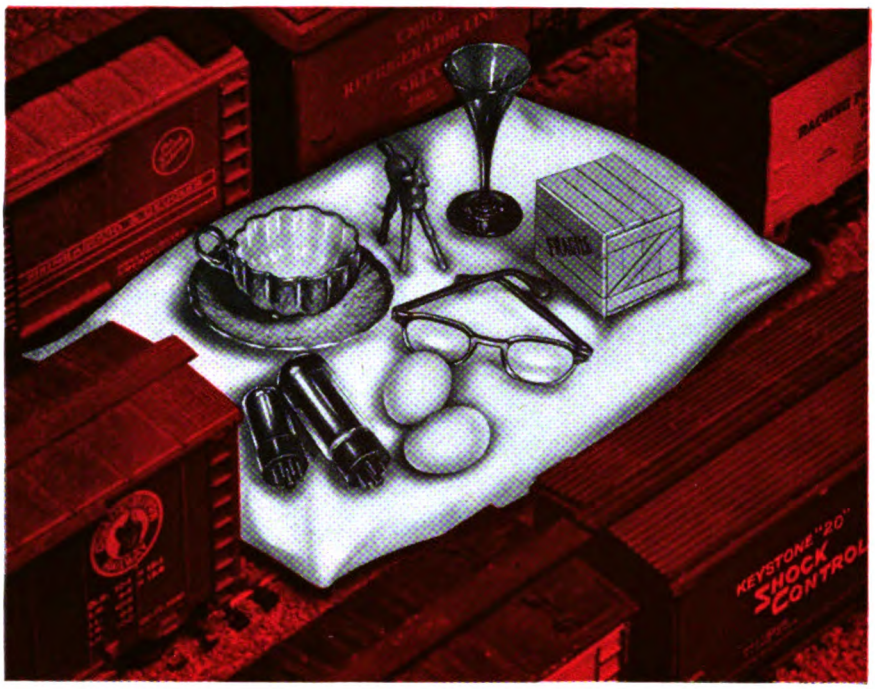
"For the present, we will skip the gramming switch used for transi- n, taking it up at another session. is brings us to the dual-purpose dback power control that operates conjunction with the load regulator. e feedback power control consists two sets of transductors in a mag- tic amplifier circuit. Remember that transductor is a form of saturable re reactor. One set of transductors known as Main Generator Current ansductor, shown on the wiring int as MGT-A and MGT-B. The ner set of transductors are Gener- or Voltage Transductors, known as VT-A and GVT-B.

"The main generator transductors erate as a magnetic amplifier to pply a signal proportional to the ength of the main generator current. ie main output lead of the generator sses through a window opening of e core of the reactor frame to serve as d-c control coil of the reactor. Cur- nt in the a-c coil depends on the d-c rrent flowing through the control il. When main generator current is gh, its action in the control coil re- ices the impedance in the a-c coils, rmitting the a-c current to rise. This c current, the feedback signal from e main generator, is always propor- onal to the ampere output of the nerator.

"The control circuit is wired so that ie a-c feedback signal current passes rough the primary of control trans- rmer T-2. The current from the sec- ndary of the T-2 transformer is then ctified and added to the signal cur- nt set up by transductors GVT-A nd GVT-B.

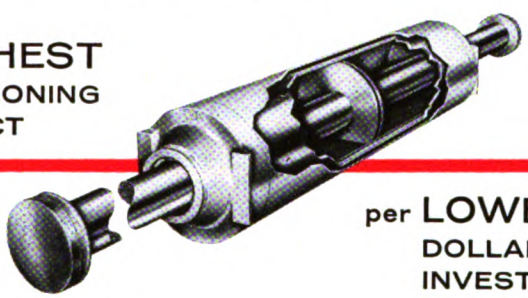
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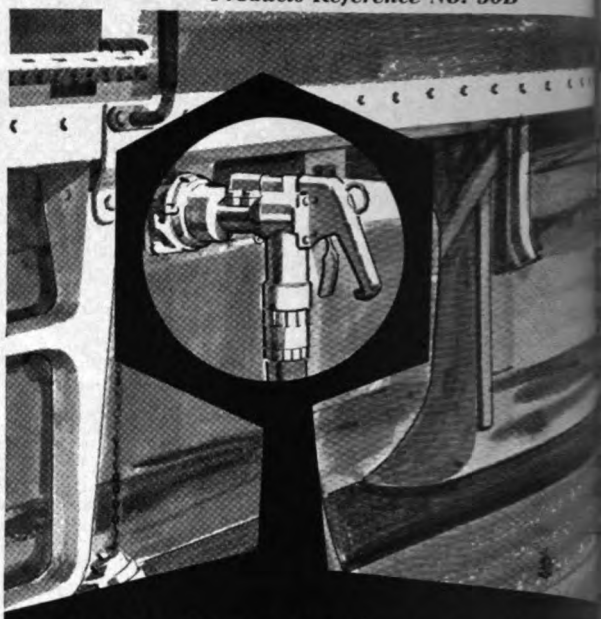
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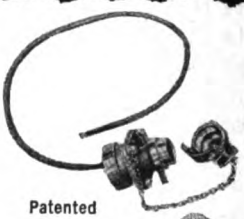
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(Continued from page 20)

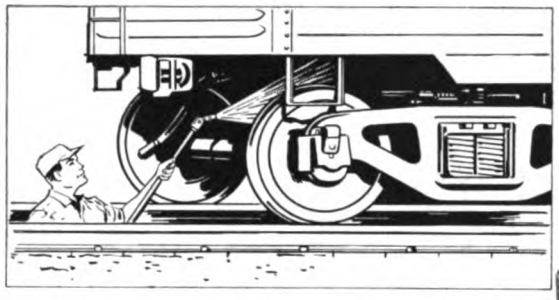
section side plates. Two 3/16-in. ned door headers and threshold es complete with gussets are ap- d by welding to form an integral t of the side structure. The 84 ng tie anchors throughout the car recessed in the side posts to pro- e a flush interior. Strap-type lading- id anchors are applied full height each of the fixed and movable door ts. In the side sheets at each inter- diate side post below the side plates re are two 11/16-in. diameter vent holes. The car sides are riveted and welded to the side-sill channels.

Corrugated steel ends on the first 350 cars consist of 3/16-in top and 1/4-in. bottom copper-bearing steel plates, welded into a single unit and riveted and welded to the car sides, end sills and car roof. On the last 300 cars, 9/64-in. top and 3/16-in. bottom Cor-Ten steel was used. Interiors of the ends are lined with 11 or 12-gage steel lining, welded in place. Nailable steel floors are applied in individual panels the entire length of car. Filler is put in each nailing groove after the panels are installed. The floor is then given a final coat of top dressing. Other interior car coatings are ADM-410 on the sides, enamel on the ends, and insulating compound on the underside of the roof.

Length over end sills is 50 ft 8¼ in.; clear door opening 15 ft 4½ in. x 9 ft 11¼ in.; inside width, 9 ft 5⅝ in.; height, 10 ft 7 in. Cubic capacity is 5,079 cu ft. Light weight is 54,000 lb. Trucks are equipped with 3 11/16-in. travel springs.

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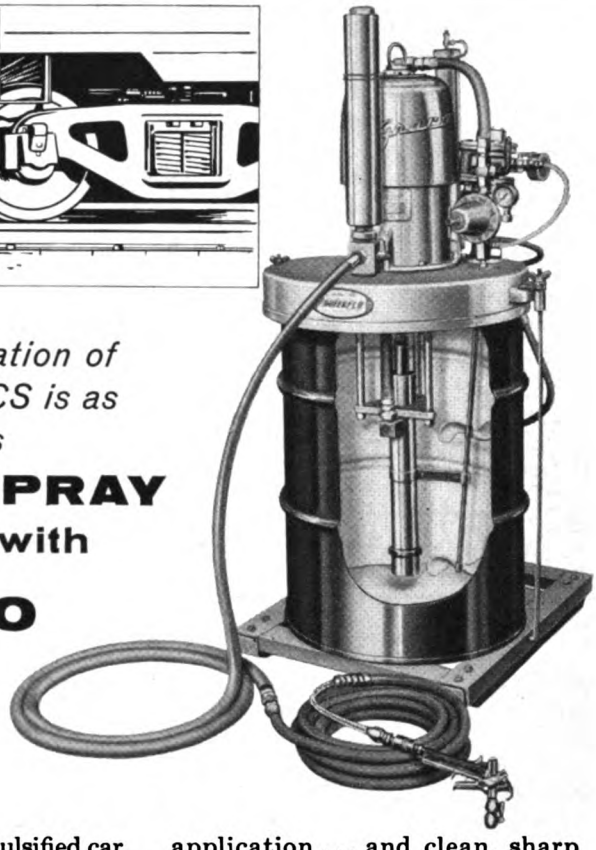
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Report

(Continued from page 5)

which railroads have been experiencing in recent months (RL&C, Aug. 1962, p 32) is expected to be still better when large numbers of Hi-Hat bearings are in service. This new design has the advantage of absorbing impact forces on the wedge with a definite interlock between the bearing and wedge. By taking the impact forces on the wedge, the possibility of pinching the bearing is practically eliminated. Also, the contact surface under the wedge has no depressions to lock into the wedge when wear at these contact surfaces does occur.

Authorization for applications is to be secured through the Director of Mechanical Research at the AAR Research Center in Chicago. Railroads making applications of the new design are required to submit semi-annual performance reports.

Monthly reports covering bearing shipments by size are now being furnished the Research Department by the bearing manufacturers. Suppliers of the Hi-Hat bearing at the present time are American Brake Shoe Co., Magnus Metal Corp., and Canadian Bronze Co., Ltd. Wedges may be secured from Standard Forgings Corp. and Schaefer Equipment Co. Standard wedges can also be converted.

Cast-Iron Wheel Causes Derailments

Failure of a cast-iron wheel under a 50-t loaded hopper car resulted in the derailme of a New York Central freight train whi was then struck by a passenger train mov at 67 mph on an adjacent track. The pa senger train was also derailed. The accide which resulted in 44 injuries, occurred Ligonier, Ind., on the NYC line betwe Toledo, Ohio, and Elkhart, Ind., on Febr ary 10, 1962.

Wheel failure was ascribed as the dera ment cause by a recently issued ICC repo The wheel, on the front axle of the fro truck of a Virginian hopper car, was of th bracketed cast-iron type manufactured October 1954. After the accident, thr small pieces of the flange were found seve teen miles east of the point of derailmen adjacent to a crossover through which th 140-car freight had passed. Two large piec of the broken-off section were found ap proximately 30 ft east of the point of init derailment. One of these pieces was abou 24 in. in length along the flange and abou 9 in. in maximum width across the flang the rim, and into the plate. The other piec was about 13 in. in length along the flan and 8 in. in maximum width across th flange, the rim, and into the plate. Abo 28 in. of the flange was separated from the two pieces and that part of the wheel re maining on the axle. The mate of the broke wheel had moved outward 1½ in. on th axle wheel seat, apparently as a result the derailment.

Examination of that part of the broke wheel remaining on the axle disclosed n evidence of this wheel having been loo or having turned on the axle wheel sea Flange and tread were within the limits wear prescribed by AAR standards. The was no evidence of slid flat spots. Fres marks on the rail and fragments of th wheel flange found 17 miles from the poi of derailment, it is apparent that serio chipping of the flange began at that poi Fracture of the flange and tread then co tinued until derailment occurred.

Spontaneous Combustion Becoming Pad Problem

Journal lubricating devices undergoi renovation can catch fire through spontan ous combustion. The AAR Mechanical D vision has been receiving reports of su fires, F. Peronto, executive vice-chairma reported recently.

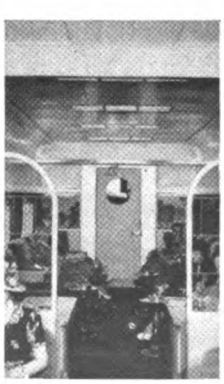
Investigations which have been made t dicate that prolonged heating of the co material seems to set up an internal rea tion which is exothermic, and the he generated sometimes keeps pad tempera ture increasing to the ignition point as th oil is extracted. This indicates that prope means of cooling must be provided afte the lubricators have been washed in hot o and have had the oil extracted. This cooli period is particularly important just befor the renovated lubricators are placed in shi ping containers. Lubricators saturated oil in journal boxes spontaneously catch o fire under normal rising temperatures whic are below the point of classification as hot box. The Mechanical Division urges a

5 YEAR WARRANTY

for **MET-L-WOOD BAGGAGE CAR DOORS**

Now, all Met-L-Wood Baggage Car Doors are fully warranted to perform satisfactorily for five years. They will not warp, twist or swell. They require no through bolts, screws or rivets. Tough and strong, they withstand more abuse than other type doors in all kinds of weather.

Met-L-Wood Doors are proven doors. For more than a decade Met-L-Wood Baggage Car Doors have been in use and continue to prove their superiority. For complete details on how Met-L-Wood Doors can do a better job for you, *write for Bulletin 520-12K.*



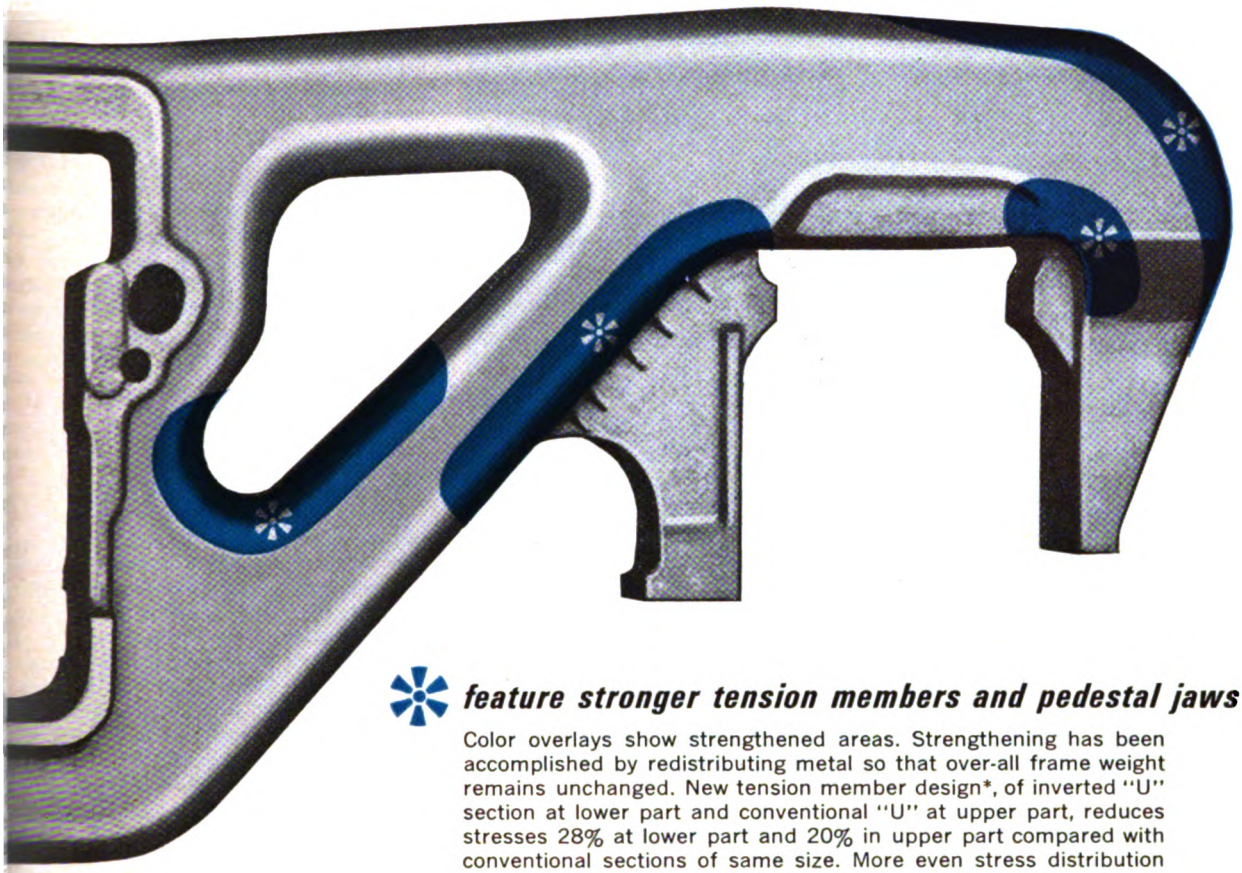
Met-L-Wood Doors are also available for other interior and exterior uses. They offer complete waterproof edge and surface seal to add years of useful door life. There are types and sizes available to meet every road requirement.

BUILD IT STRONGER · BUILD IT LIGHTER · MET-L-WOOD · BUILD IT TO LAST

MET-L-WOOD *Corporation*

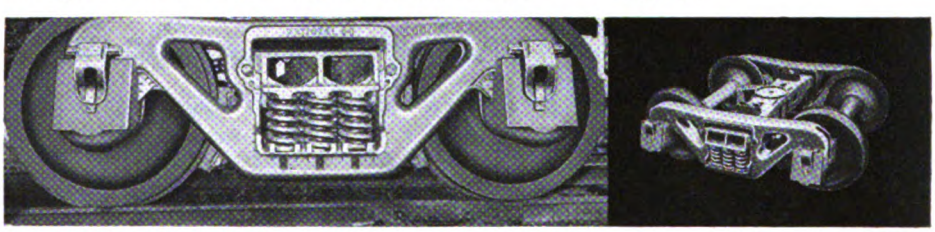
6755 WEST 65TH STREET
CHICAGO 38, ILLINOIS

NEW 6½ X 12 HEAVY DUTY
NATIONAL C-1 TRUCKS



feature stronger tension members and pedestal jaws

Color overlays show strengthened areas. Strengthening has been accomplished by redistributing metal so that over-all frame weight remains unchanged. New tension member design*, of inverted "U" section at lower part and conventional "U" at upper part, reduces stresses 28% at lower part and 20% in upper part compared with conventional sections of same size. More even stress distribution throughout whole frame is feature of new design. *Patented





Service-Proven C-1 Snubbing Mechanism Gives Smoothest Ride at Lowest Maintenance

The new 6½ x 12 truck is the top of the C-1 Truck line — the most desirable heavy-duty freight truck in production. Through a scientific approach to the problem of metal redistribution, it has greater strength without any increase in over-all frame weight . . . has an even stress distribution that shrugs off high impact forces.

Equally important, the 6½ x 12 C-1 shares with other trucks in the National C-1 family — the 5 x 9, 5½ x 10, and 6 x 11 — the exclusive C-1 design vertical shock snubbing mechanism — the only friction snubbing mechanism service-proven to have been right — right from the start.

No matter which National Truck you specify, you get all these important C-1 Truck advantages: Smooth ride . . . longer wear life . . . proven maintenance economy of under 5 cents per C-1 Truck in service over a 14-year period. *Or, to put it another way, about one-third of a cent per C-1 Truck per year for maintenance!*

Transportation Products Division

RPI MEMBER

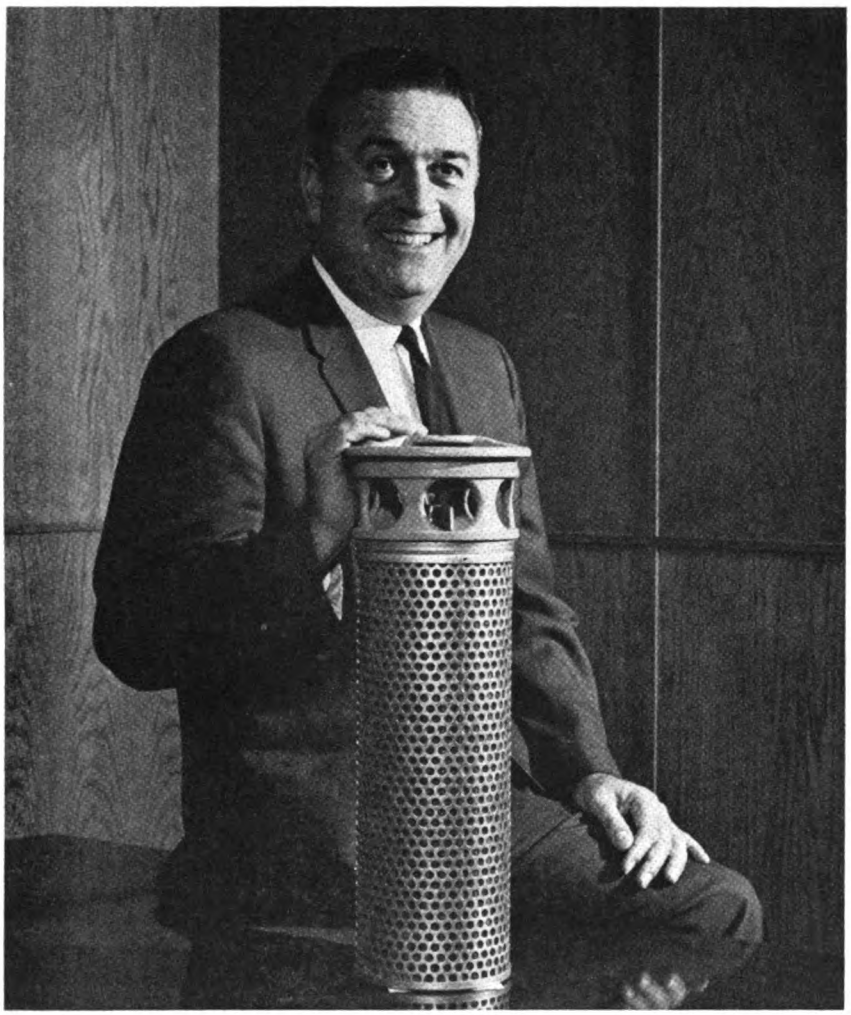
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Cleveland 6, Ohio

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NATIONAL CASTINGS COMPANY
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ROLLER BEARING ADAPTERS • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM

A-6754A



"We didn't go looking for trouble —they brought it to us..."

"The life span of lube oil strainers used in many locomotives was much too short. No matter how carefully the copper screens were handled when removed from their cases for cleaning and servicing, they had a tendency to puncture and pull apart.

"When this problem was brought to us, we redesigned the cartridge — toughened it up, crimped the screen, doubled the filter area, reinforced it with a metal shield and designed it to fit existing housings. It solved the problem and resulted in considerable annual savings to the railroads.

"That's how most of the products in our line were developed. People in our engineering department found an answer to other people's problems. That's why over 85% of diesel locomotives in America today are equipped with one or more Farr products."

R. S. Farr

PRESIDENT, FARR COMPANY, LOS ANGELES
MANUFACTURERS OF FILTRATION EQUIPMENT FOR THE RAILROAD INDUSTRY

concerned with the renovation of jou lubricating devices to take cooling pre tions with lubricators.

No Paint on Wheels, AAR Group Warns

Paint on freight-car wheels makes pr control of speed with hump-yard reta difficult. The AAR Mechanical Divisio again brought to the attention of all fre car owners that Interchange Rule 3 quires that wheels are not to be pai Overspeed impacts have resulted in reta yards when paint on wheels under s cars has acted as a lubricant, makir difficult to regulate car speed with reta devices. The Mechanical Division sug that shields always be used to cover insides and outsides of the wheels w cars are spray painted. Car owners sh not accept cars from builders when ins tion reveals that they have paint on insides and outsides of the wheel rims

Million-Mile Records Set by 39 Roads

Thirty-nine railroads operated with 1,000,000 miles per hot box set-off betw terminals in June, according to reports mitted to the AAR Mechanical Divis National average in June was 938,576 m per set-off—down slightly from the prev two months but up from the June 1 figure. Railroads with top performance w Delaware & Hudson, 3,507,382 miles set-off; Denver & Rio Grande West 3,366,435 miles; and the Clinchfield, 3,2 051. June national figures for all railr from 1957 through 1961 and for the firs months of 1962 follow.

	Cars set off between terminals with hot boxes	Mi per set
June 1957	24,562	115,
June 1958	18,013	145,
June 1959	20,169	138,

	Pads	Waste	
June 1960	1,795	14,934	159,
June 1961	2,193	6,608	293,
1962			
Jan.	2,307	1,078	728,
Feb.	2,133	816	797,
March	2,301	808	868,
April	1,872	625	1,028
May	2,135	667	962,
June	2,082	684	938,

Orders for New Equipment

Placed Since Closing of Sept. Issue

Locomotive Orders

BALTIMORE & OHIO.—*Electro-Motive:* 77 2, hp GP-30 units. Deliveries to be completed mid-December. Under a replacement arra ment, B&O turning in 77 FT and F3 units.

CHESAPEAKE & OHIO.—*Electro-Motive:* 14 GI and 19 SD-18 diesel-electric units. Being acqu under road's locomotive replacement progr Deliveries scheduled to begin early in 1963.

MINNEAPOLIS, NORTHFIELD & SOUTHERN.—*E tro Motive:* 2 1,200-hp SW-1200 units equip with MU control. Delivered. Units to replace or two 2,000-hp road transfer locomotives wh will be sold or scrapped.

ISSOURI PACIFIC.—*Electro-Motive:* 36 1,200-hp :chers. For delivery late this year and early in :.

EW YORK, SUSQUEHANNA & WESTERN.—*Elec-Motive:* 3 GP-18 1,800-hp diesel-electric road :chers. Delivered. Purchase price covered by)vernment-guaranteed loan of $550,000.

ENNSYLVANIA.—*General Electric:* 22 2,500-hp el-electric freight locomotives. For delivery month.

EABOARD.—*Electro-Motive:* 34 2,250-hp diesel-tric locomotives for freight service. For de-ry between November and February. Cost, ap-ximatly $6,390,000. As part of transaction, board trading in 24 older 1,350-hp units.

eight-Car Orders

URLINGTON.—*Company shops:* 100 50-ft, dou-deck stock cars equipped with roller bearings. t, $815,000. Scheduled for completion by mid-ember.

)ETROIT & TOLEDO SHORE LINE.—*Greenville Steel* :: 100 52½-ft, 70-ton FMS flat cars, equipped h skids and skid covers for handling coiled el. Cost, $1,327,500. For December delivery.

RISCO. — *Thrall Car:* 60 89-ft cushion-under-me flat cars equipped with Pargon bi-level auto ks and Brandon tie-down equipment. Deliver-to be completed by mid-January 1963.

RUIT GROWERS EXPRESS.—*Company shops:* 345 ton and 20 50-ton refrigerator cars. Deliveries, rate of six cars per working day, to begin in cember.

MINNEAPOLIS, NORTHFIELD & SOUTHERN.—*Pull-n-Standard:* two 90-ton, 4,000-cu ft covered)per cars of triple-hopper design, equipped for avity and pneumatic discharge. Cost per unit 2,875. For fourth-quarter 1962 delivery.

NEW YORK CENTRAL.—*Company shops:* 50 all-el, bay-window cabooses. Cost, approximately 50,000. Deliveries to begin in December.

NORTH AMERICAN CAR.—*ACF:* 18 55-ton, 89-ft v-level flat cars equipped with roller bearings d auto racks. Unit cost, $12,700. *Bethlehem el:* seven 70-ton, 85-ft flat cars equipped with ler bearings. Unit cost, $14,500. Both orders flat cars for assignment to Grand Trunk West-n. *Pacific Car & Fdry.:* 30 70-ton insulated re-igerator cars equipped with 30-in. Hydracushion derframes, at unit cost of $19,000; 20 for as-nment to Erie-Lackawanna.

NORTHERN PACIFIC.—*Company shops:* 200 70-n, single-sheath steel box cars. Deliveries sched-ed for early 1963.

PENNSYLVANIA.—*Company shops:* 500 50-ft 6-., 70-ton box cars with cushion underframes and -ft wide doors. Deliveries to begin in December. 0 standard 70-ton hopper cars. Built in Sep-mber.

SANTA FE.—*Pacific Car & Fdry.:* 200 50-ft, 70-n shock control insulated box cars with load di-ders. *General American:* 50 85-ft piggyback flat rs.

SOO LINE.—*United States Railway Equipment :.:* 200 50-ton box cars. On lease. Deliveries to completed by January 1.

SOUTHERN PACIFIC. — *Greenville Steel Car:* 40 0-ton Tenelon stainless-steel covered hopper rs. The three-compartment, 4000-cu-ft cars to ndle food products, powdered chemicals, and her bulk commodities.

UNION TANK CAR CO.—*Company shops:* 65 tank rs—Regular cars: three 20,000-gal; seven 8,000-l; three 12,000-gal. Pressure cars: two 1,600-l; six 6,200-gal; 22 of "short" 30,000 gal capac-y; 13 22,500-gal; and two 20,000-gal. Miscellane-is cars: two 17,000-gal insulated tanks; four 000-gal acid cars, and one 3,800-cu-ft covered)pper car.

assenger-Car Orders

UNION PACIFIC. — *Budd:* 9 86-ft mail-storage rs. For delivery second and third quarters of 963.

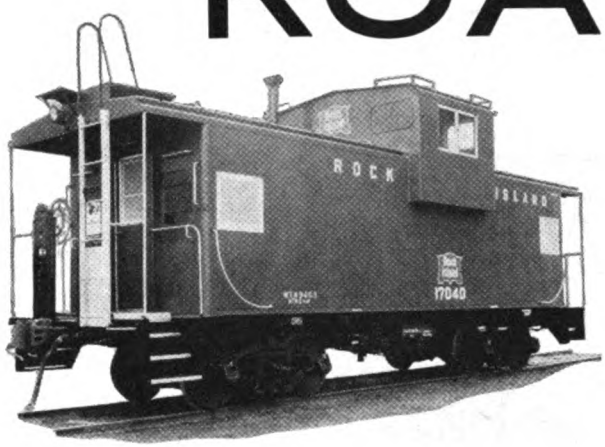
lotes and Inquiries

Missouri Pacific has authorized $8 million equip-ent expenditure for the acquisition of 56 new comotives — the 36 1,200-hp switchers listed bove, also 20 1,800-hp GP-18 road switchers. ixty-six existing units will be traded in on the ew locomotives. Road has purchased 15 baggage ars from Delaware & Hudson.

Santa Fe, in addition to orders listed above, will ater order 500 more 50-ft, 70-ton shock control nsulated box cars with load-restraining devices, 00 to be equipped with load dividers. Road will lso order 24 hi-level chair cars similar to equip-ent now in service on "El Capitan."

Trailer Train to acquire 844 flat cars for lease n piggyback service. Estimated cost, $12,000,000.

one for the ROAD



...that won't drive you to drink

There are some on every railroad . . . cabooses that eat up as much money as they do miles. Why not retire these rolling profit-reducers in favor of new International Cabooses. Your crews would enjoy the extra comfort — and be far more efficient as a result. Your books would reflect the savings in maintenance. We build several standard models — or — if you've got your own ideas, we'll work to your specifications.

INTERNATIONAL Cabooses SAVE YOU MONEY

Write International Car Division, 835 Englewood Avenue, Buffalo 23, N. Y.

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MORRISON INTERNATIONAL CORP.

LOOKING FOR A WAY TO

CLEAN

VITAL ENGINE PARTS

FASTER?

TRY THE

LIX

DIESEL CLEANERS

STOPWATCH TEST



You'll hardly believe your eyes when you see how much faster... how much better vital engine parts are cleaned. LIX Diesel Cleaners are especially compounded for removing tough, burned-on carbon, grit and grime. Soil soaks away with amazing speed... at less cost, too, because LIX Cleaners last longer due to less-frequent changes. Whether you soak or spray, there's a LIX Cleaner for your every cleaning need... fuel injectors, pistons, liners, engines, lube oil cleaners, oil and air filters, exterior surfaces, upper decks—**anything** on the diesel.

TRY THE LIX DIESEL CLEANERS TEST RIGHT IN YOUR OWN SHOP! Write or call today for a FREE demonstration by a LIX Service Engineer. He'll provide the LIX Diesel Cleaners best suited to your needs... and the watch for proof-positive testing, too! See for yourself how LIX will save you time... **and** money.



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201 Railroad Avenue • Corona, California
82 Wall Street • New York, New York

(3517)

Personal Mention

Atlantic Coast Line.—*Jacksonville, Fla.:* C. STRINGFELLOW, assistant to chief mechanic officer, appointed assistant chief mechanic officer—engineering, succeeding H. H STEIN, now purchasing agent.

Baltimore & Ohio.—*Baltimore, Md.:* GEORG M. BEISCHER appointed assistant chief me chanical officer. Formerly chief mechanic officer, Western Maryland.

Chesapeake & Ohio.—*Huntington, W. V.* Huntington now headquarters for K. REED, chief mechanical officer; C. D. A LEN, superintendent motive power; T. HACKNEY, JR., assistant to chief mechanic officer, and H. J. BAKER, general superi tendent car department. Formerly locate at Richmond, Va. *Newport News, Va* H. E. BOSTER appointed general foreman– piers. *Hinton, W. Va.:* U. G. CLEMONS ap pointed general foreman, succeeding J. H MARKS, retired.

Chicago & North Western.—*Chicago:* W. SIPCHEN, superintendent air equipment, re tired. D. F. DILGARD appointed supervis air brakes and lubrication — car. R. A KENNARD appointed supervisor air brake and mechanical instruction—motive powe

Escanaba & Lake Superior. — *Wells, Mich* LEROY C. JACOBSEN appointed master me chanic, succeeding C. ROBERT ROSE, retired

Lake Superior & Ishpeming. — *Marquett Mich.:* ROBERT G. JACOBA appointed chief mechanical officer.

New York Central. — *East Rochester, N.Y.* CARROLD STEVENSON appointed shop super intendent. *Beech Grove, Ind.:* H. C. HAUP appointed superintendent of shops, succeed ing Mr. Stevenson. G. M. SCHMIDBAUER appointed general foreman, freight shop.

Northern Pacific.—*St. Paul, Minn.:* G. A WEBSTER appointed superintendent car de partment. J. D. KROHNE, assistant to me chanical engineer, appointed assistant su perintendent car department, succeeding Mr. Webster.

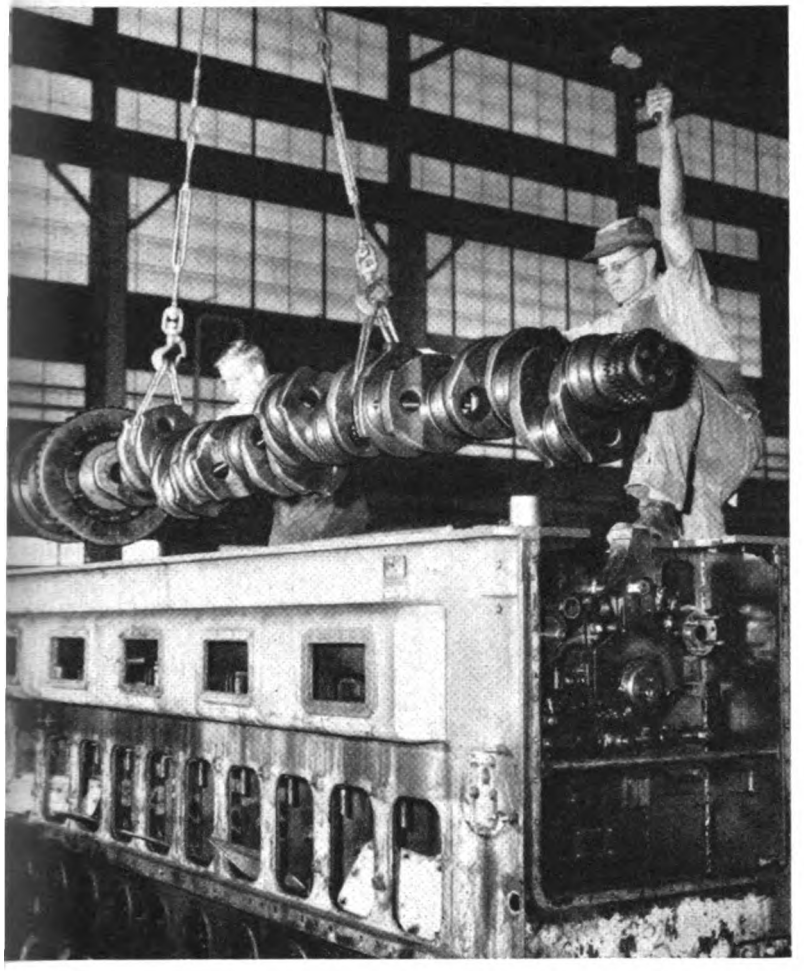
Pennsylvania. — *New York:* C. R. GRONI GER appointed assistant road foreman engines, succeeding JAMES J. GREGORY, re tired. Mr. Groninger formerly assistan road foreman of engines at Meadows, N. J

Santa Fe.—*Barstow, Calif.:* E. M. HIATT ap pointed superintendent of shops. *Chicago* DONALD M. MILLER appointed master me chanic to succeed Mr. Hiatt. Mr. Miller formerly master mechanic at Arkansas City Kan. *Newton, Kan.:* W. R. COWDREY, mas ter mechanic, named general master me chanic.

Western Maryland. — *Hagerstown, Md.* WALTER C. KRESGE, superintendent car equipment, appointed chief mechanical officer.

OBITUARY

Hubert Hawthorn, retired mechanical engineer, Central of Georgia, died on August 20 at his home in Savannah, Ga.



NEW ENGINE WARRANTY ON OLD O-P ENGINES!

Fairbanks-Morse Opposed-Piston Engine Renewal Service upgrades old O-P engines with the latest in design and materials. Gives them new performance efficiency. Lowers maintenance costs.

Full FM Renewal includes . . . dismantling and cleaning . . . precision inspection . . . parts replaced when necessary . . . reassembly by experts . . . full operational test . . . *all with a New Engine Warranty!*

Bring your engines up-to-date. Write: Fairbanks, Morse & Co.; Railroad Renewal Parts Sales; Beloit, Wisconsin.

FAIRBANKS MORSE
A MAJOR INDUSTRIAL COMPONENT OF
FAIRBANKS WHITNEY

132 Years of Customer Acceptance Engineered Into Every FM Product
Compressors · Diesel Engines
Engine Accessories · Generators · Motors · Pumps · Scales

ıpply Trade

LEDO-BEAVER TOOLS, INC.—*Frank Orris* appointed manager of field sales.

■

ULD-NATIONAL BATTERIES. — *G. Millington, Jr.*, appointed general sales ıager, Industrial Battery Division.

■

ANS PRODUCTS CO.—Transportation ipment and Industrial Div.: *James J. way* elected vice-president in charge of all operations. Railroad Equipment .: *G. J. Veague, Jr.*, sales engineer, apted Chicago regional sales manager, *Edward Ostroski*, sales engineer, apted assistant sales manager at Plymouth, h.

■

. MORTELL CO. — *Harry A. Lowry ssociates*, 14643 Burbank Blvd., Van s, Calif.; appointed West Coast repreative, Mortell Railroad Division.

■

ORADO FUEL & IRON CORP. — *mas A. Rape* appointed railroad sales neer.

■

STINGHOUSE AIR BRAKE CO., AIR KE DIVISION.—*C. M. Hines*, manager of neering, elected a Fellow of the Ameri- Institute of Electrical Engineers in rection of "achievement in the develop- and design of control equipment in field of transportation."



Paul N. Strobell
Alco



Frank K. Veasman
Chicago Malleable Cstgs

ALCO PRODUCTS, INC.—*Paul N. Strobell* appointed manager of newly created locomotive and engine products division. Mr. Strobell will be in charge of manufacturing, production engineering, sales services, and material and production control at locomotive assembly plant in Schenectady, N. Y., and diesel engine plant in Auburn, N. Y.

■

CHICAGO MALLEABLE CASTINGS CO.—Railroad Division: *Frank K. Veasman* named vice-president. Mr. Veasman formerly manager. *John H. Staiger* appointed assistant manager.

■

ACF INDUSTRIES, AMERICAN CAR & FOUNDRY DIV.—*William J. Ruprecht* appointed manager of Technical Center being installed in St. Charles, Mo. Mr. Ruprecht formerly manager of research and development engineering at Berwick, Pa.



W. Bradley Gilkey
Sparton



F. M. Shobe
EMD

SPARTON CORP., SPARTON RAILWAY EQUIPMENT DIV.—*W. Bradley Gilkey* appointed to newly created position of general sales manager at Detroit, Mich. *Roy J. Anderson* appointed central region sales manager at Chicago.

■

GENERAL MOTORS, ELECTRO-MOTIVE DIV.—*Fletcher M. Shobe* appointed manager, Sales Engineering Dept., La Grange, Ill.

■

CAMEL CO., LTD. — *Arthur J. Doyle* elected president of Camel, a Canadian subsidiary of the Youngstown Steel Door Co., of which Mr. Doyle is vice-president. Mr. Doyle's headquarters will continue in Cleveland, Ohio.

■

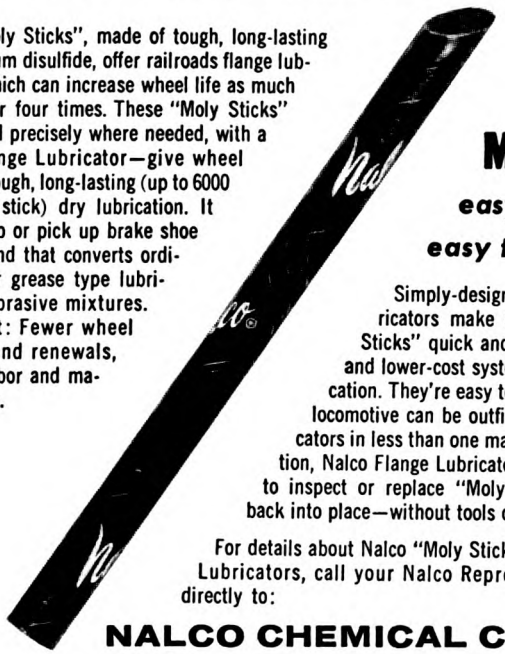
RAILWAY MAINTENANCE CORP. — *Donald J. Hogan & Co.* named exclusive Chicago area representative.

Products Reference No. 58A

Increase Wheel Life up to 300%!

With Nalco Moly Stick Flange Lubricant

Nalco "Moly Sticks", made of tough, long-lasting molybdenum disulfide, offer railroads flange lubrication which can increase wheel life as much as three or four times. These "Moly Sticks" are applied precisely where needed, with a Nalco Flange Lubricator—give wheel flanges a tough, long-lasting (up to 6000 miles per stick) dry lubrication. It won't creep or pick up brake shoe dust or sand that converts ordinary oil or grease type lubricants to abrasive mixtures. The result: Fewer wheel turnings and renewals, reduced labor and material costs.



Moly Sticks

easy to install,

easy to maintain

Simply-designed Nalco Flange Lubricators make application of "Moly Sticks" quick and easy—a far simpler and lower-cost system than "wet" lubrication. They're easy to install, too: a diesel locomotive can be outfitted with eight lubricators in less than one man-day. After installation, Nalco Flange Lubricators can be swung out to inspect or replace "Moly Sticks" and swung back into place—without tools or special equipment.

For details about Nalco "Moly Sticks" and Nalco Flange Lubricators, call your Nalco Representative, or write directly to:

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Subsidiaries in England, Italy, Mexico, Venezuela and West Germany
In Canada: Alchem Limited, Burlington, Ontario

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. . . Serving Railroads through Practical Applied Science

AAF AMER-kleen air filters do a better job at lower cost on engine intakes and carbodies



NOW INSTALLED ON 29 RAILROADS . . .

On-the-job operation in locomotives has clearly demonstrated these three major competitive benefits of AMER-kleen replaceable glass fiber filters:

1. **LOWER INITIAL COST.** The cost of metal panel filters is at least 70% more than for AMER-kleen retaining frames.
2. **LOWER FILTER OPERATING COST.** It's far less expensive to replace AMER-kleen glass fiber media at regular intervals than to wash and re-oil metal filters.
3. **LOWER LOCOMOTIVE MAINTENANCE COSTS.** AMER-kleen allows far less dirt (about half that of metal filters) to get to – and into – your equipment.

AAF makes all three types of filters used in engine intake and carbody service – metal, oil bath and AMER-kleen. We **recommend** AMER-kleen, and we think you'll **demand** AMER-kleen when you know all the facts. Write: J. K. Sparrow, Engine & Compressor Dept., American Air Filter Company, Inc., 348 Central Avenue, Louisville, Kentucky.

AAF **American Air Filter**

BETTER AIR IS OUR BUSINESS

Products Reference No. 58B

HUCK MANUFACTURING CO. *George F. Parker* named to Southern gion sales staff.

■

GRIFFIN WHEEL CO.—*Edwara C. vanaugh* named assistant vice-presiden Griffin, a subsidiary of Amsted Indust Inc. *Roger H. Rosen* succeeds Mr. K naugh as chief engineer.

■

SHERWIN-WILLIAMS CO.—*William McCombs* of Pembroke, Mass., named cial sales representative, handling rail paints and special finishes in New Engl area.

■

PITTSBURGH FORGINGS CO. — *L rence W. Ingold,* sales manager, ele vice president—sales.

■

MORTON MANUFACTURING CO Marvin W. Wolfe of Wolfe Equipment appointed Morton's sales representativ St. Louis territory.

■

STONE FILTER CO.—*Guy F. Wiles,* pointed technical representative at Bra ville, Md. Mr. Wiles is retired superinte ent of motive power, Eastern Region, B more & Ohio.

■

STRAN-STEEL CORP.—*John R. Sind* Box 323, Wynnewood, Pa., appointed e ern sales representative, Stran-Steel tr portation products sales, in New Y Philadelphia-Baltimore area.

■

FRANKLIN CONTAINER CORP *Dillard Paper Co.,* Greensboro, N.C., pointed southeastern distributor for Gard barrier material.

■

AMERICAN HOIST & DERRICK CO *Felix Sweeney* appointed to newly crea position of eastern sales manager, w jurisdiction from Pittsburgh, Pa., to east seaboard, including New England. He quarters, East Rutherford, N. J.

■

INTERNATIONAL EQUIPMENT CO *C. W. Smith* appointed executive vice-pr dent, continuing to head Railway S division.

■

SPEE-FLO CO.—*Floyd H. Stewart* nam sales manager at Houston, Tex.

■

ELECTRIC STORAGE BATTERY C EXIDE INDUSTRIAL DIV.—*John R. Smy* assistant director of engineering, appoin director of engineering, succeeding *Lel E. Wells,* retired. *Dr. D. Thomas Ferr Jr.,* associate director of engineering, a *E. Albert Wagner,* service engineering m ager, marketing division, named assist directors of engineering.

■

TURCO PRODUCTS, INC.—*Dan T. Bu* named president, succeeding *S. G. Tho bury* who has become a senior vice-presid of Purex Corp., Ltd., Turco's parent co pany.

OBITUARY

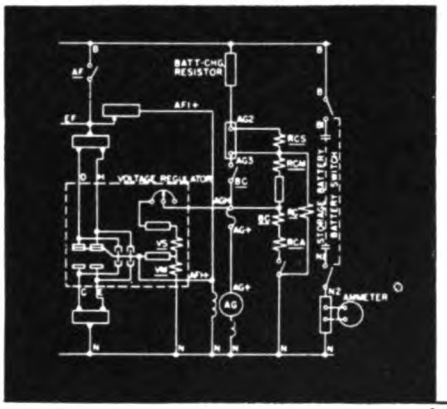
E. P. O'NEILL, retired assistant gene sales manager, Hyatt Bearings Division General Motors, died at his home in Dow ingtown, Pa., on August 21.

SIMPLIFY LOCOMOTIVE CONTROL PANELS...REDUCE MAINTENANCE COSTS

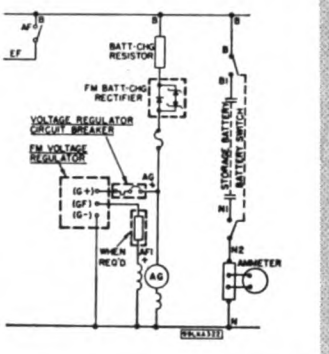
with Fairbanks-Morse **Transistor** Voltage Regulators and Battery Charging Rectifiers. For use on Fairbanks-Morse, ALCO, EMD, GE and Baldwin Locomotives.

Replace your present mechanical voltage regulator, battery charging contactor and reverse current relay with this FM Regulator-Rectifier package.

Eliminate components containing moving parts subject to wear, burning and misadjustment.



Before installation of FM Regulator-Rectifier Package



After installation of FM Regulator-Rectifier Package

COMPACT SEALED UNITS • LOW COST • MAINTENANCE FREE • EASILY INSTALLED



FM TRANSISTOR VOLTAGE REGULATOR

- No moving parts... shockproof
- Simple adjustment... micro-second response
- ± 1% voltage regulation
- Standardization... one regulator for all locomotives with 75 V auxiliaries.



FM BATTERY CHARGING RECTIFIER

- 300 and 400 PIV ratings
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- Transient voltage suppression
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EARING LUBRICANTS. Chart A-helps select the proper lubricant by recommended viscosity of oil for bearings according to rpm, load, and ation method. Lubricants for anti-n bearings listed by speed factor. Sun).

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ASMA CUTTERS. Bulletin No. 145, mal Arc Plasma Cutters," describes e of hand-held and machine-mounted plasma cutting torches complete with operating systems and accessories. Process operation, advantages, and savings explained. Thermal Dynamics Corp.

60. NON-DESTRUCTIVE TESTING. New edition of "Seeing Isn't Always Believing" tells of the progress of non-destructive testing, including Magnaflux accomplishments and contributions in magnetic particle testing, fluorescent penetrant testing, pulse ultrasonic flaw detection and thickness measurement, and eddy current testing. Magnaflux Corp.

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October, 1962

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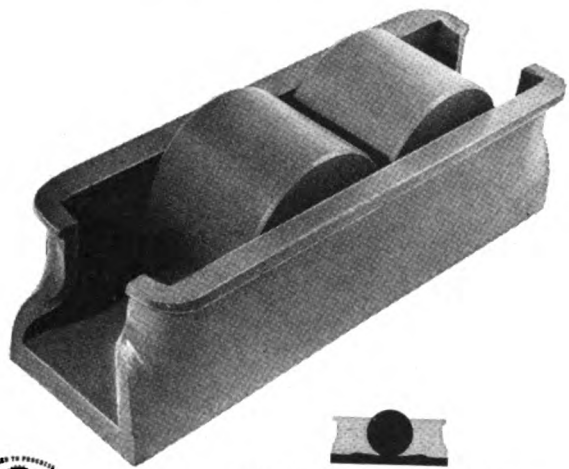
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E. C. Poole, in his new book* on railroad co analysis (page 30) says that fuel consumption is th most satisfactory basis for allocation of expense o road locomotives, while engine-hours is the mo accurate gage on which to distribute the expens of yard locomotives.

Whether you agree or not, you'll find informativ and challenging the author's reasons for reachin this conclusion—and hundreds of others of equa importance, for attaining maximum earnings an efficiency on any railroad, including your own!

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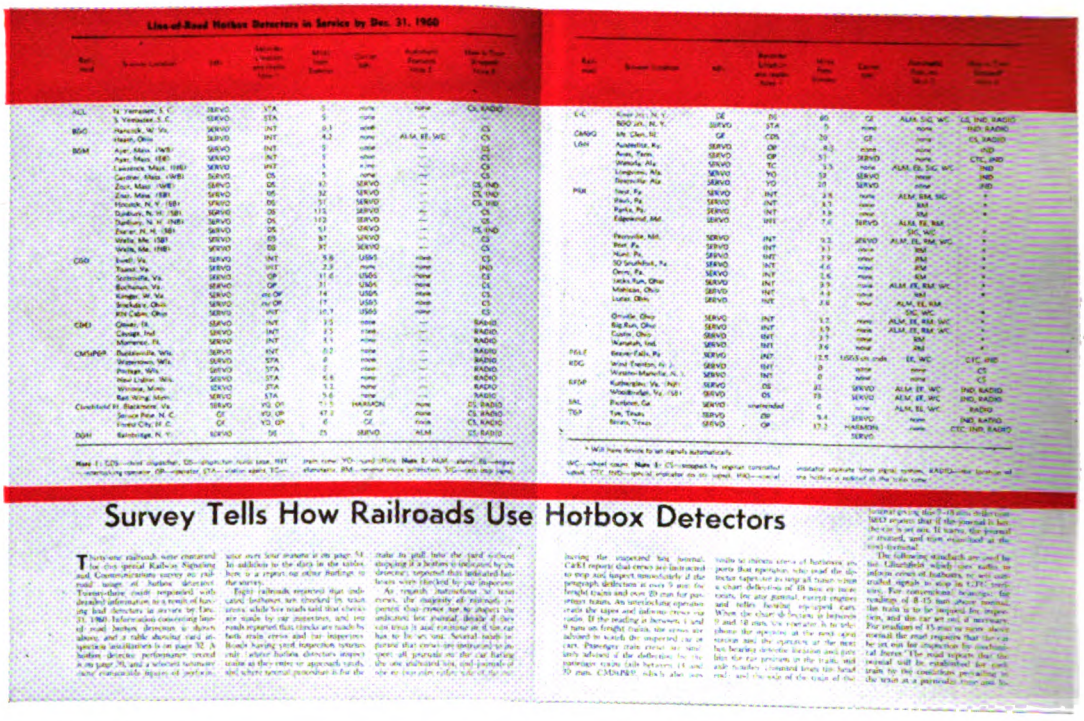


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This booklet gives you the facts and figures that prove no railroad today can afford to be without hot box detecto

We didn't write this booklet. Railway Signaling & Communications did. The hard facts presented in it aren't ours. They are actual figures available from railroads experienced in the use of SERVOSAFE® Hot Box Detectives*. The results speak for themselves. They prove hot box losses can be controlled. The figures can be translated into dollar savings for your road. Every railroadman should have a copy of this booklet. To get yours, write: Railroad Products Division, SERVO CORPORATION OF AMERICA, 111 New South Road, Hicksville, L. I., N. Y.



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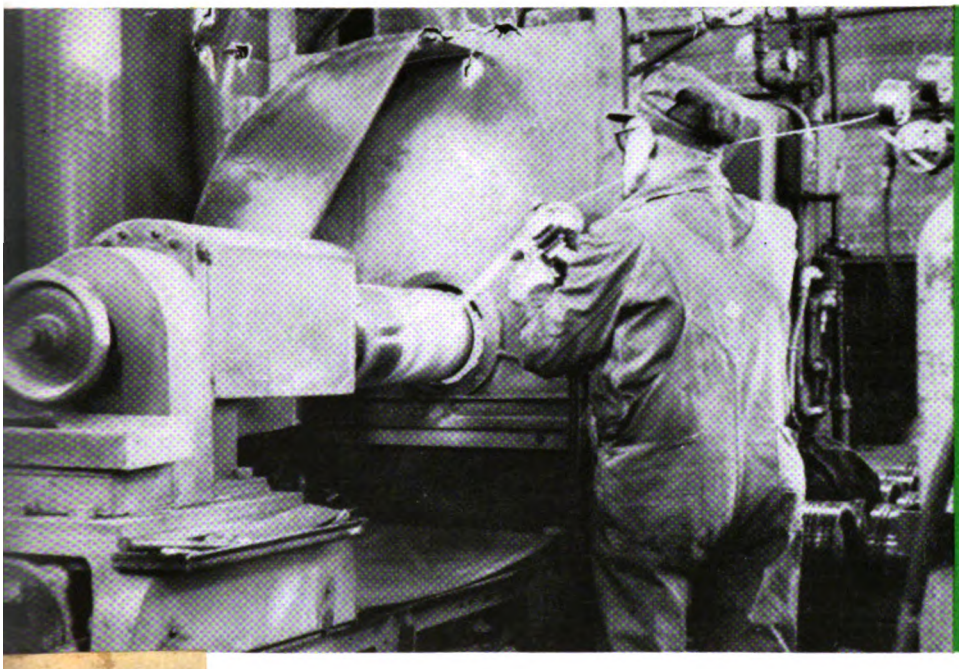
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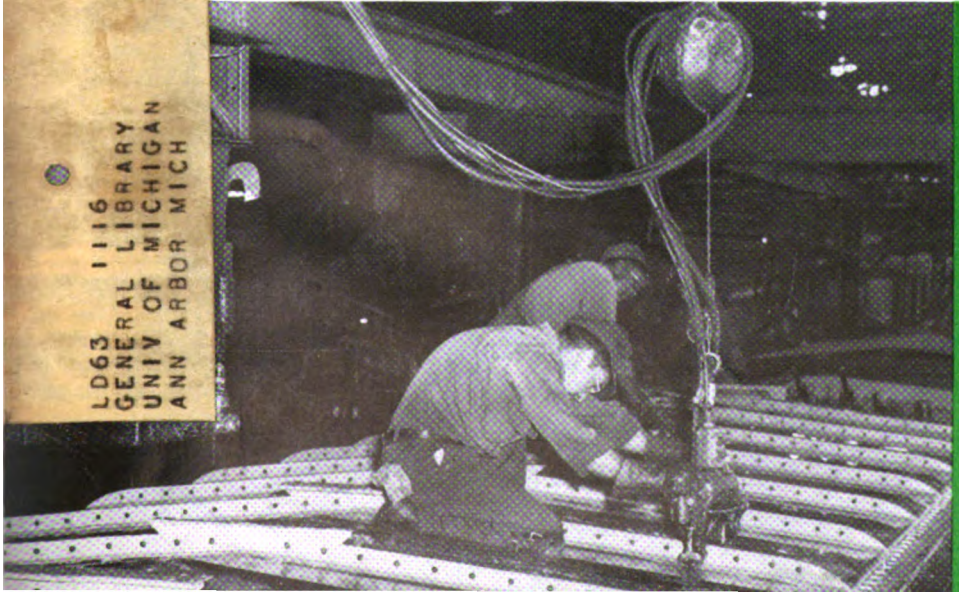
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RAILWAY
LOCOMOTIVES AND CARS
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Northern Pacific Locomotives Are Overhauled at Livingston Shop

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P-S Building 100-Ton Box Cars for Louisville & Nashville

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LOOK UNDER YOUR CARS



You'll see that most Armco One-Wear Wheels have served longer than 15 years

Chances are that new Armco One-Wear Wrought Steel Wheels installed under your cars today will still be there—in good condition—decades from now.

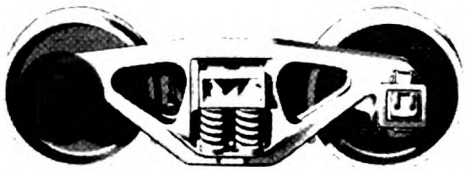
Most of the more than 1¼ million wheels produced by Armco already have given 15 to 20 years of service. Some have been rolling since 1932, when Armco started making this type of wheel—and **only eight** have been reported defective. Forging and rolling under tremendous pressure packs that kind of wear-, shock- and stress-resistance into each Armco One-Wear Wrought Steel Wheel.

Wheel safety and maintenance are no problems when you put Armco Wheels under your cars. Their reliability is service-proved. Your nearest Armco Sales Office can give you the complete story of durable Armco Wheels. Call them soon, or write **Armco Division, Armco Steel Corporation, 1602 Curtis Street, Middletown, Ohio.**

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WHICH ONE IS HOT?



You can never be sure without SERVOSAFE® Hot Box Detectives*

'onically, many of the measures irected toward *preventing* hot- oxes have the secondary effect of aking them harder to detect by 'dinary visual and manual inspec- on when they do occur. Improved ıbricants withstand higher temper- ures before breaking down and leasing tell-tale smoke. Lubricator ıds, admirable successors to waste ıcking in most respects, are less ıbject to smoking and ignition. oller bearings, with their fine record of performance, give rtually no warning short of burnoff when they do fail. Add these problems of detection the greater speeds and heavier ads of the modern freight train and it is no wonder that 'railments due to hotboxes continue to mount despite the ost careful inspection procedures.

Long before a faulty bearing or journal begins to reveal its ındition to the eye or hand, events take place within the urnal box which are readily detected by a SERVOSAFE® sys- m. An ultra-sensitive, high speed infrared element "looks" the same area on all passing journal boxes, regardless of ıeed, and reacts individually to the heat radiating from each ıe. These responses are converted to electronic signals which 'e amplified and mechanically recorded to give a permanent record of all journals on the train. Hotboxes—even those that are just *beginning* to overheat—are easily identified by high "pips" on the SERVOGRAPH® chart. These pips are not measurements of temperature but relative indications of overheating, using the normal average of the other journals as the reference standard, plainly visible on the same chart. The SERVOSAFE® system is not intended to *replace* conventional inspection but, rather, to *supplement* it—with a degree of certainty and reliability not possible to achieve by visual and manual means alone.

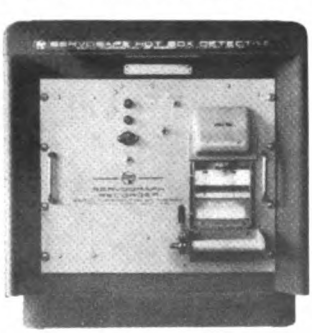
Inspectors on roads equipped with SERVOSAFE® Hot Box Detective systems *know* when a journal is running hot. They are informed of its location, even before the train reaches the yard. When the train pulls to a stop, inspectors concentrate their attention on the "suspects"...take corrective action *before* damage occurs. And chances of a faulty bearing leaving the yard, with burnoff and derailment a possible consequence, are reduced to an absolute minimum.

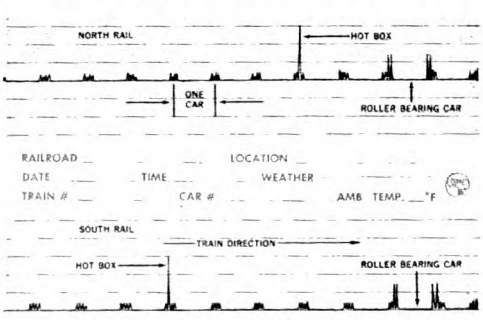
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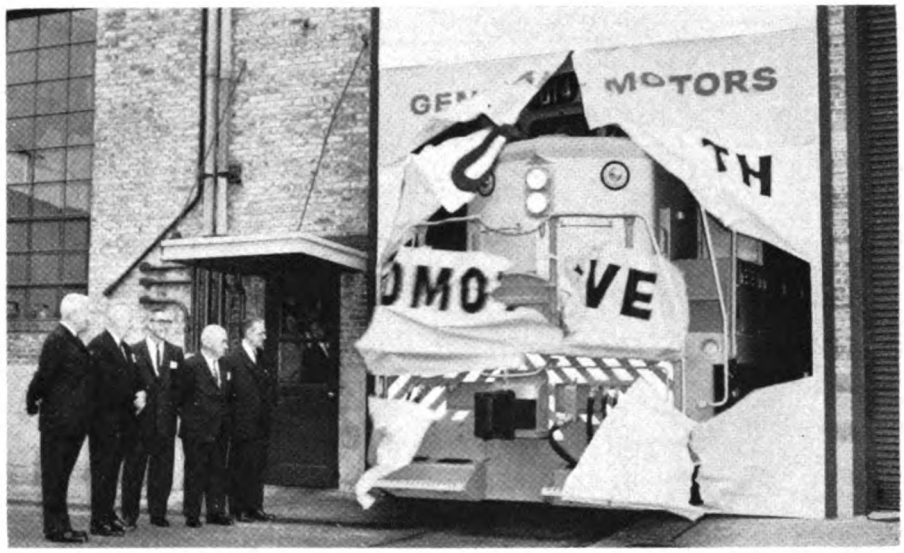
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REPORT FOR NOVEMBER



Watching as GM's 25,000th locomotive bursts through barrier at EMD plant at LaGrange, Ill., are (left to right): C. Chayne, vice president—engineering staff; C. R. Osborn, retired executive vice president and former general manager, Electro-Motive Division; J. E. Goodman, executive vice-president, General Motors; and J. M. Roche, executive vice-president, General Motors.

GM Delivers 25,000th Diesel

Old and new met at LaGrange, Ill., last month. The old was the Louisville & Nashville "General," 4-4-0 steam locomotive built in 1856, which pulled in under its own power. The new was the 25,000th General Motors locomotive, a 2,250-hp GP-30 which was being delivered to the L&N. Scene was the LaGrange plant of GM's Electro-Motive Division where the majority of the 25,000 GM diesel units, in service worldwide, have been built.

GM marked this production milestone with a celebration attended by 250 railroad leaders from the L&N and other domestic roads, and from Canada and other nations. R. L. Terrell, GM vice-president and EMD general manager, pointed out that production of the 25,000th unit was significant because it indicates "the widespread acceptance of the diesel locomotive on American and overseas railroads — an acceptance gained by its outstanding performance and economic contribution to railroad operations. It was achieved in scarcely more than 25 years, which focuses attention on the dramatic improvement in manufacturing techniques and facilities which has made possible the mass production of such a huge and complex product. The importance of this is demonstrated by the fact that the locomotive being honored today — vastly superior in every way to our first production model—costs much less per horsepower in spite of great increases in manufacturing costs that have occurred in the intervening years.

"Our engineers have succeeded in putting close to 10 gal in a 5-gal bucket," Mr. Terrell continued. "Output of the engine and capacity of the electric transmission have been greatly increased, yet the bore

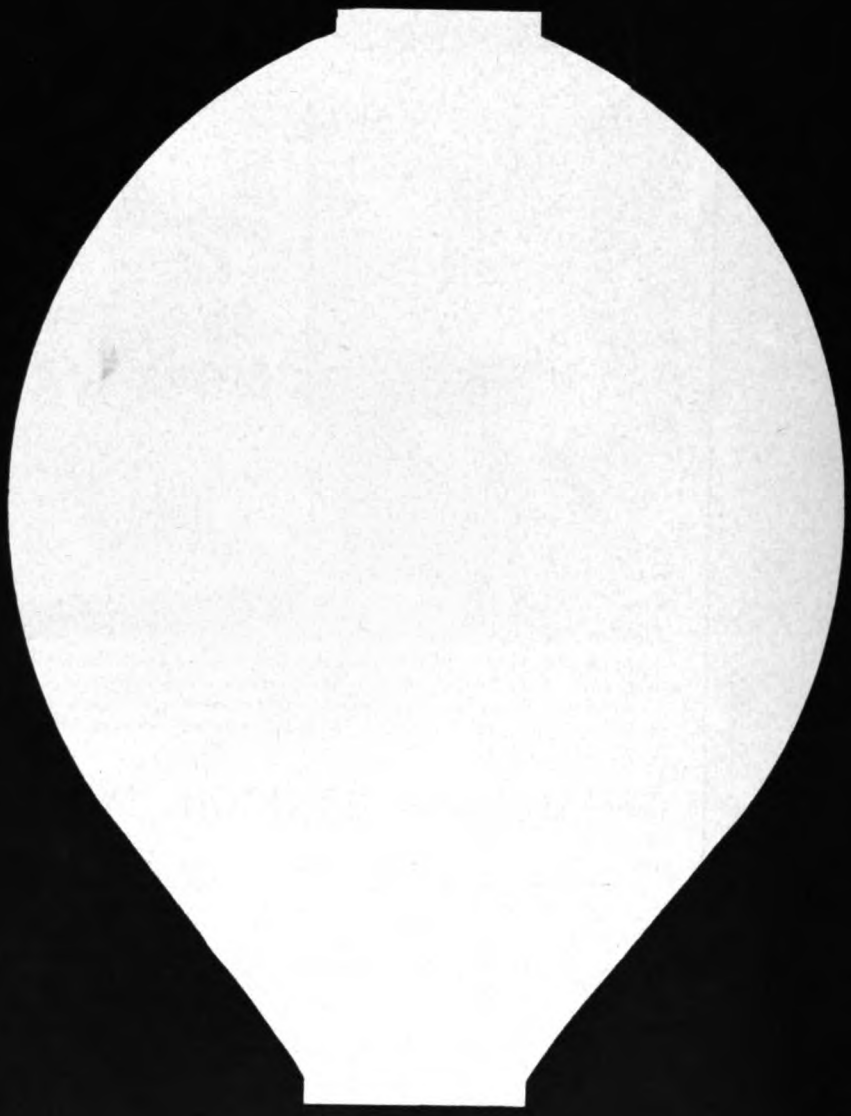
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TIME SAVING IDEAS FOR NOVEMBER

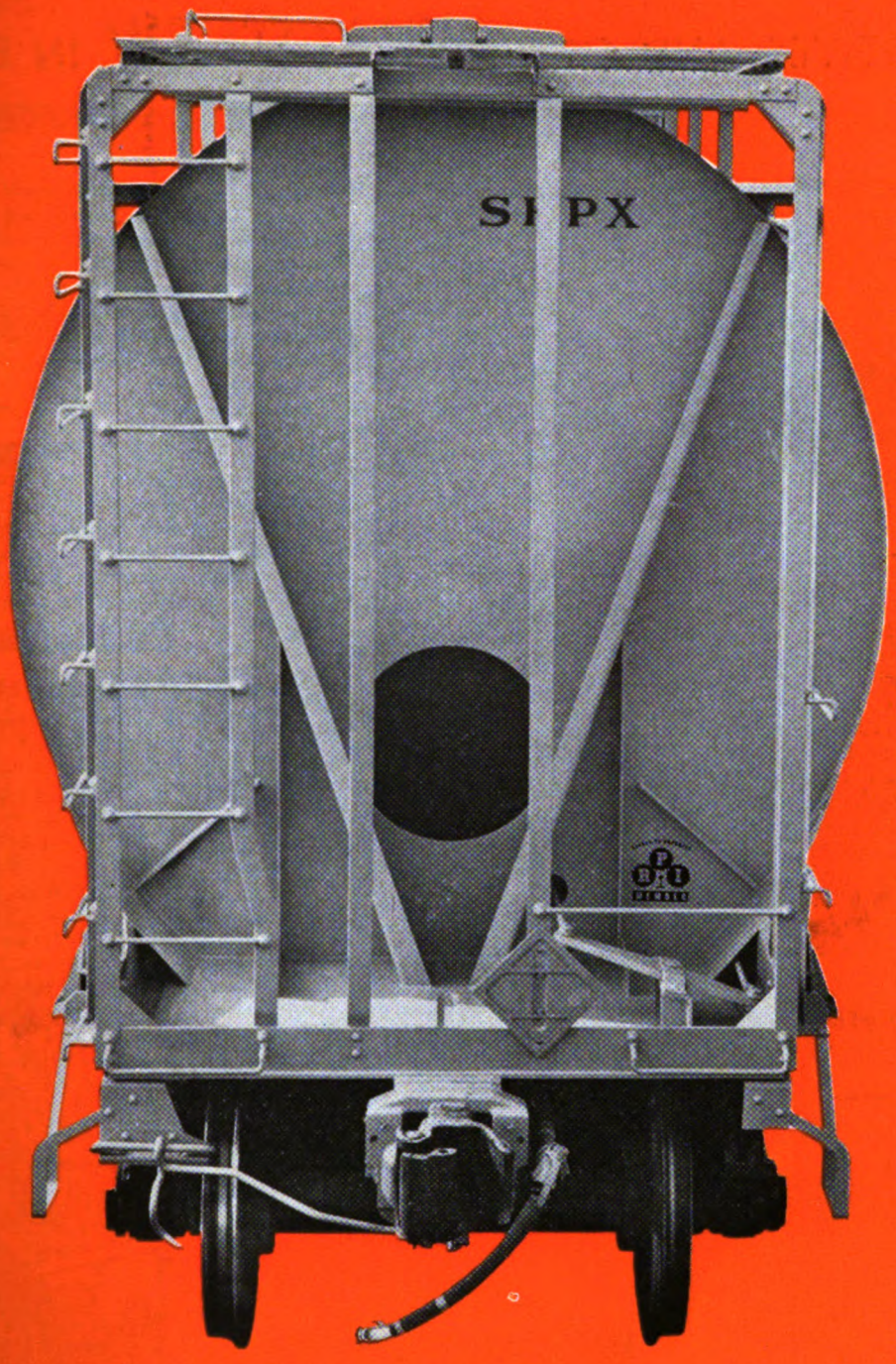
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Why is it pear-shaped?



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Good reason. With its unique, pear-shaped compartments, you can fill it to 97% of its capacity. This is the greatest use of cubic capacity by any dry bulk handling car.

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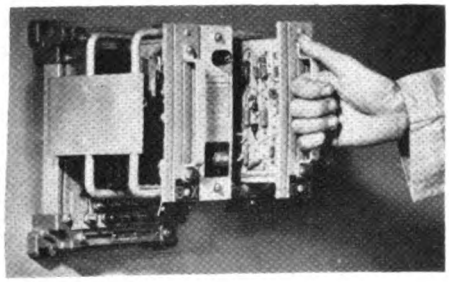
Fastest unloading! Grain, sugar, flour, chemicals, plastic pellets all slide out with the least possible hang-up. Unloading hatches are lined up center bottom. (No space-wasting center sill to get in the way as in old-style cars.) What's more, Center Flow compartments are smooth as a rifle bore—no obstructions to cause contamination. They're virtually self-cleaning.

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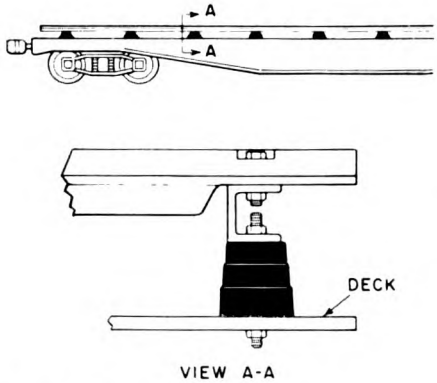
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Voltage Regulator

The circuit design of the 17FH20B1 static voltage regulator uses silicon-controlled rectifiers to increase resistance to damage from voltage surges and spikes found in control circuits, and extends the range of ambient temperatures in which the regulator may be operated continuously without damage. Wiring is connected to terminals on the front of the regulator, and electrical connections are made through integral plugs and receptacles. The main circuits are mounted on two cards for easier maintenance; one may be pulled out by hand and a new one inserted. Automatic armature-current limit control may be added to the regulator by installing resistive shunt in the auxiliary generator armature circuit. The regulator was developed specifically for diesel-electric locomotives, but may be used in other railway applications. General Electric Co.

For more information, circle 11-1 on coupon on page 47.



Cushioned Deck

Any standard flat car, box car, or gondola can be converted to cushioned service by means of the Dyna-deck system. High-strength bonded rubber mountings attached to the existing freight-car frame flexibly support the deck, protecting the lading by deflecting and absorbing impacts from starting, switching, humping, or braking operations. For a 50-ton gross load car the system uses 24 mountings, with 12 arranged along each side of the deck. Studs extend from the mounting for attachment to frame and deck. Maximum longitudinal shock transmitted to lading on a fully loaded car under a 10 mph impact is said to be less than 3.5 G's. Maximum deflection is limited to 8 in. in either direction by four elastomeric bumpers, two acting in each direction. Cost of a car conversion is estimated at about 10 to 20% of the price of a new car with equivalent shock protection. Lord Manufacturing Co.

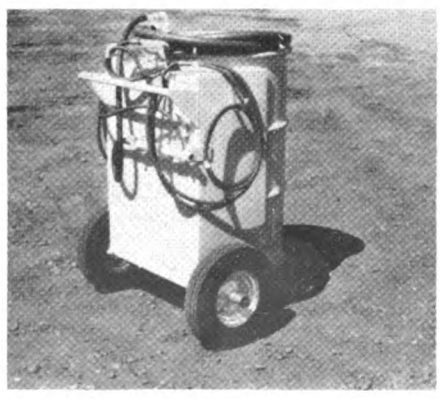
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Needle Scaler

Rust, paint and scale in hard-to-reach locations can be removed with a scaler, the 19 alloy-steel needles of which impact to clean irregular surfaces, such as contours, corners, and channels. The Series 171 has a piston stroke of $\frac{9}{16}$ in.; the Series 181, a $1\frac{1}{16}$-in. stroke. The bore for both series is $1\frac{5}{16}$ in. A round needle housing is standard equipment; a rectangular needle housing is optional. The housings are longitudinally adjustable to compensate for needle wear. A ball-locking retainer permits a quick change from needles to scaling chisel. Ingersoll-Rand.

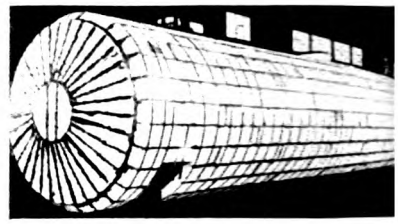
For more information, circle 11-3 on coupon on page 47.



Journal-Box Cleaner

Compressed air operates the P-M mobile journal-box cleaner. Oil is removed from the box by suction, and a scraper removes debris from lids and around the face of the box, vacuuming the material so it does not fall on the rip track. A separate tank and spray attachment is used for cleaning journal box and lid with oil or thinn solvent. This solvent is also picked up vacuum. The receiving container holds proximately 25 gal of oil and deb Paxton-Mitchell Co.

For more information, circle 11-4 on coupon on page 47.



Plastic Insulation

Foamthane, a polyurethane foamed pla has cut insulation thickness from 10 $5\frac{3}{8}$ in. on a GATX tank car hand liquid carbon dioxide, increasing la capacity. The 17,300-gal tank is cov with Foamthane blocks, $5\frac{3}{8}$ in. x 12 x 6 ft, contoured to the tank under a outer steel jacket. Under normal conditi liquid goes into the tank at —20 deg F 200 psi. Sixteen similar cars are sched for completion. Pittsburgh Corning C

For more information, circle 11-5 on coupon on page 47.

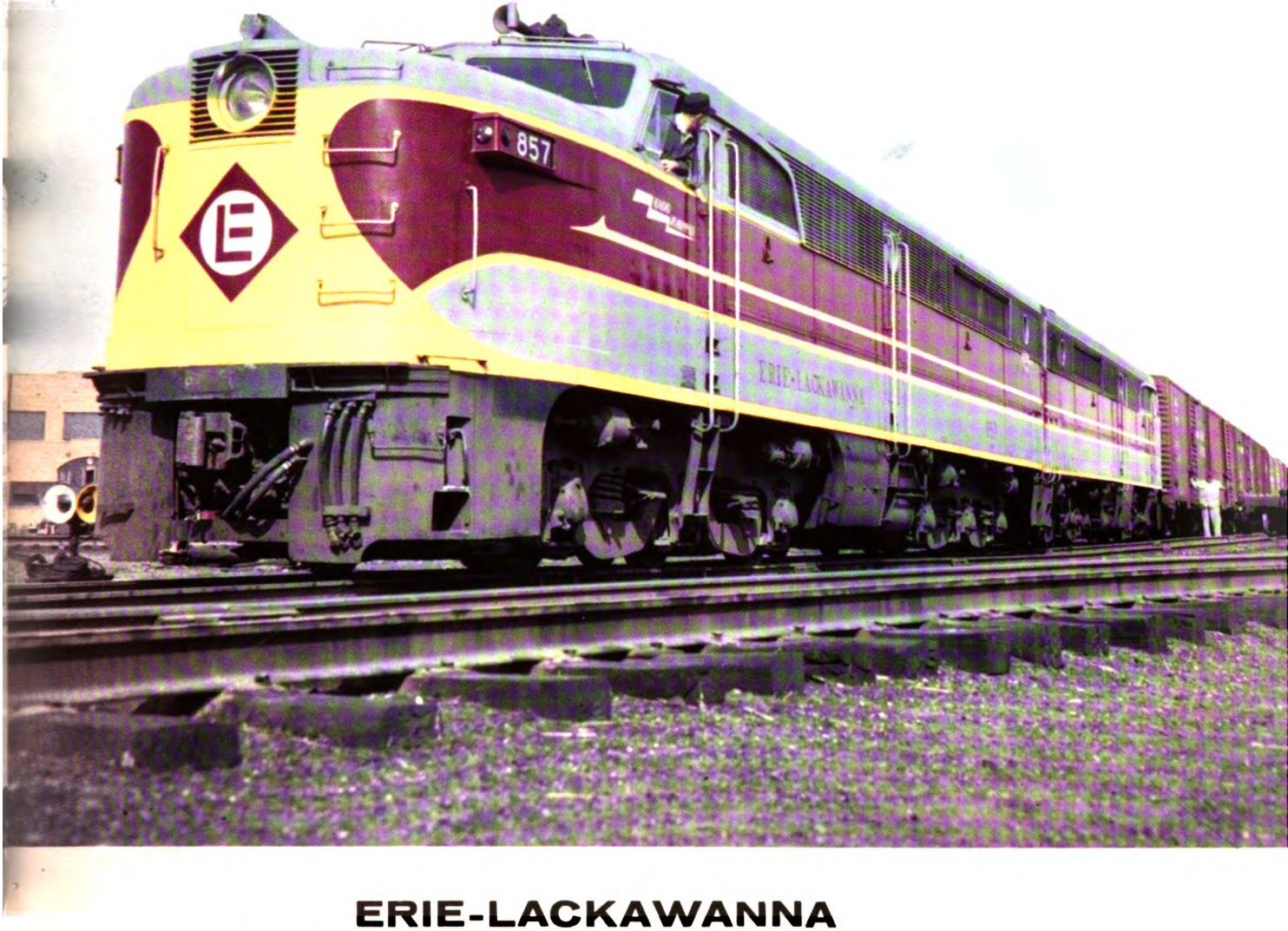


Particle Test Unit

Alternating current and half-wave current for detecting both surface and surface defects in ferrous parts and terial are furnished by the portable KH-09 900-amp magnetic particle test The 70-lb unit operates from 220 or volts, 60-cycle, single-phase current. I also be used to demagnetize parts aft ing. A Carry-All transport truck is available. A 700-amp model, KH-07, fo plications requiring lower amperage, ates from 115 volts, a-c. Magnaflux C

For more information, circle 11-6 on coupon on page 47.

A GREAT NEW TRANSPORTATION TEAM...



ERIE-LACKAWANNA

A NATIONAL BRUSH USER SINCE 1947

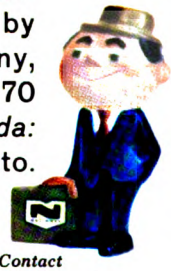
TRADE MARK

From the merger of two great transportation systems has come the Erie-Lackawanna..."The Friendly Service Route"... vital to the industrial heart of the nation... from New York to Chicago.

"National" brushes were first used on traction motors and main generators in 1947. Fifteen years of experience has proven the value of their performance on equipment operating in a highly competitive transportation area.

Excellence of commutation, minimum commutator maintenance, and long life have resulted in the use of "National" brushes on a majority of the system's total diesel electric horsepower.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.

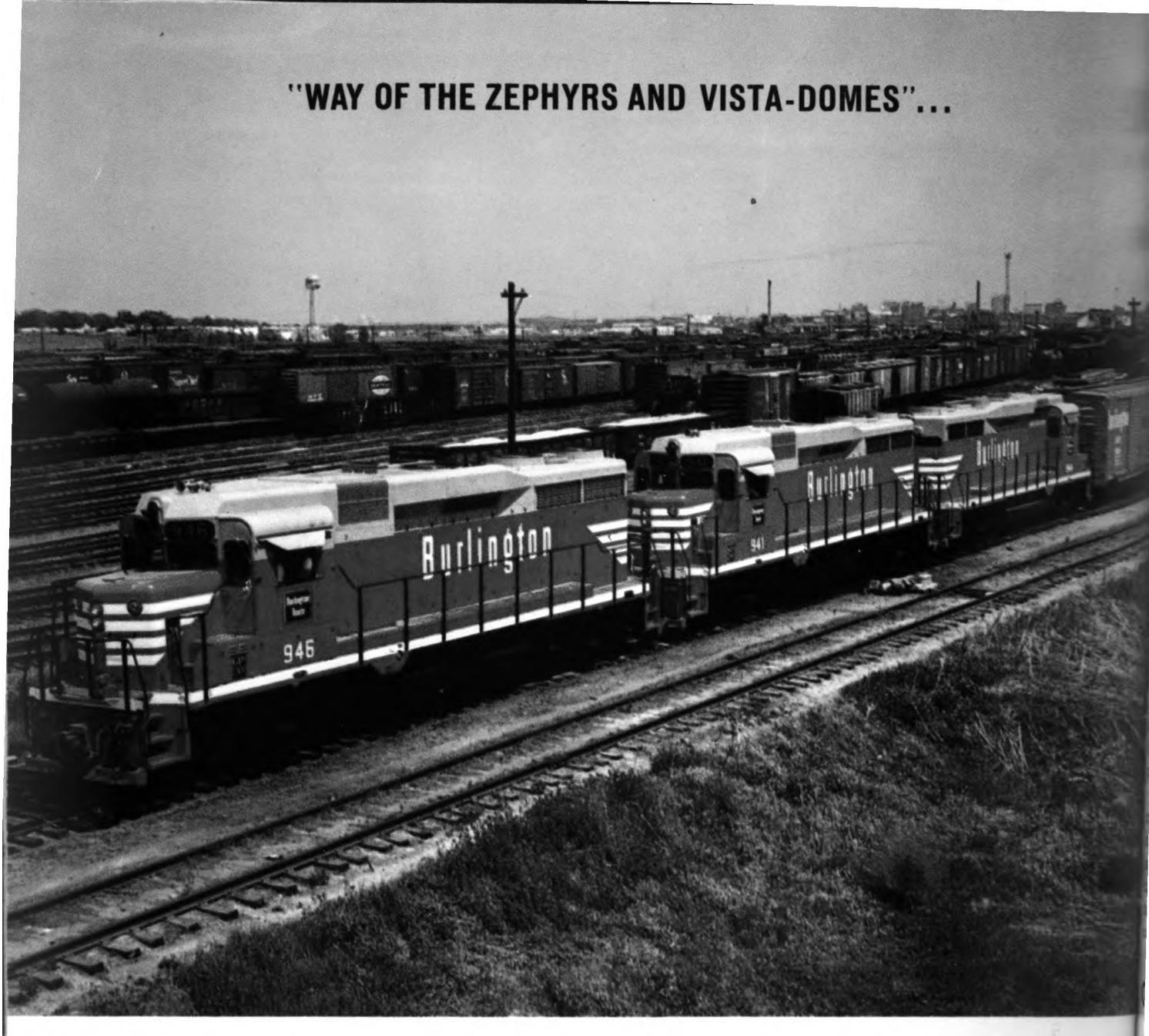


Contact Mr. National Carbon

UNION CARBIDE

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NATIONAL CARBON COMPANY



CHICAGO, BURLINGTON AND QUINCY HIGHBALLS WITH NATIONAL BRUSHES

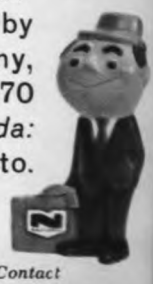
TRADE MARK

Starting at Lake Michigan, the 11,000-mile Burlington system serves an amazing complex of commerce and recreation—with connections to "Everywhere West."

Check a Burlington diesel anywhere on the system and chances are you will find "National" brushes on its traction motors and main generators. The system's high-speed service demands dependable commutation, which "National" brushes provide with minimum commutator maintenance.

The Burlington's original Zephyrs of the thirties were equipped with "National" brushes. Today these important components are used on the majority of the system's diesel units.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.



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EDITORIALS

Big Equipment

The large Louisville & Nashville box car described on Page 23 of this issue is one more example of a move toward bigness. The equipment trend has been heading in this direction for several years—toward more powerful locomotives and toward freight cars of special design, including cars with more load capacity.

In speaking of high-capacity freight cars a traffic man said recently that he believed they "show significant, though perhaps limited, promise". Of greater importance, he added, "is the growing imagination and aggressiveness of rail management, which has given birth to these and many other innovations." In the equipment field this imagination and aggressiveness has resulted in a parade of new freight cars designed either to meet the special requirements of specific shippers or to make possible a reduction in costs to both the shippers and the railroads.

The latter reason is the principal incentive for the big cars because the cost of hauling cars does not increase directly with car capacity. As a result we have the big covered-hoppers, big coal cars, big tank cars and the big box cars. They permit the railroads to offer incentive rates to shippers.

Unanimity of opinion does not exist in favor of more cubic and tonnage capacity in freight cars, any more than it does for higher horsepower per locomotive cab. There are many operations where average size cars and medium capacity locomotives are more economic. But the trend toward bigness is unmistakable. We believe that it will continue.

Car Design Fundamentals

As a result of the trend toward both large and special-design freight cars the Mechanical Division, Association of American Railroads, has initiated action to bring its design standards in line with this trend. This is recognition of an urgent need for up-to-date design requirements to guide both the railroads and car builders in the development and construction of cars that lower railroads' costs and increase shippers' acceptance.

The first step toward this goal has been taken by the recent appointment of a three-man task force. This task force was obtained on the basis of a recommendation by the Mechanical Division's General Committee that such a group was required to make a complete review of both the AAR Manual of Standard and Recommended Practice and the Supplement to the Manual that includes the drawings of AAR standard car and car component designs. The task force will work under the AAR Research Department and with appropriate Mechanical Division committees.

After the task force gets this project under way it will coordinate its activities with both car builders and supply manufacturers of car components. To save time it will work with the engineering committees of manufacturers interested in specific components such as trucks, draft gears and couplers, rather than with individual companies.

The present AAR "Fundamentals of Car Design" cover all types of freight cars. They were adopted in 1920 with several revisions but few basic changes having been made over the ensuing years. It has been suggested that three standards of design fundamentals may be necessary, one for conventional cars, one for high-capacity cars, and one for cars of special design. In view of the present trend the flexibility offered by more than one design standard may be required to encompass the design needs of current and future car types.

This overhauling of design requirements is overdue. The Mechanical Division is to be commended for the "quickly as possible" tag it has applied to the project.

Coal in the News

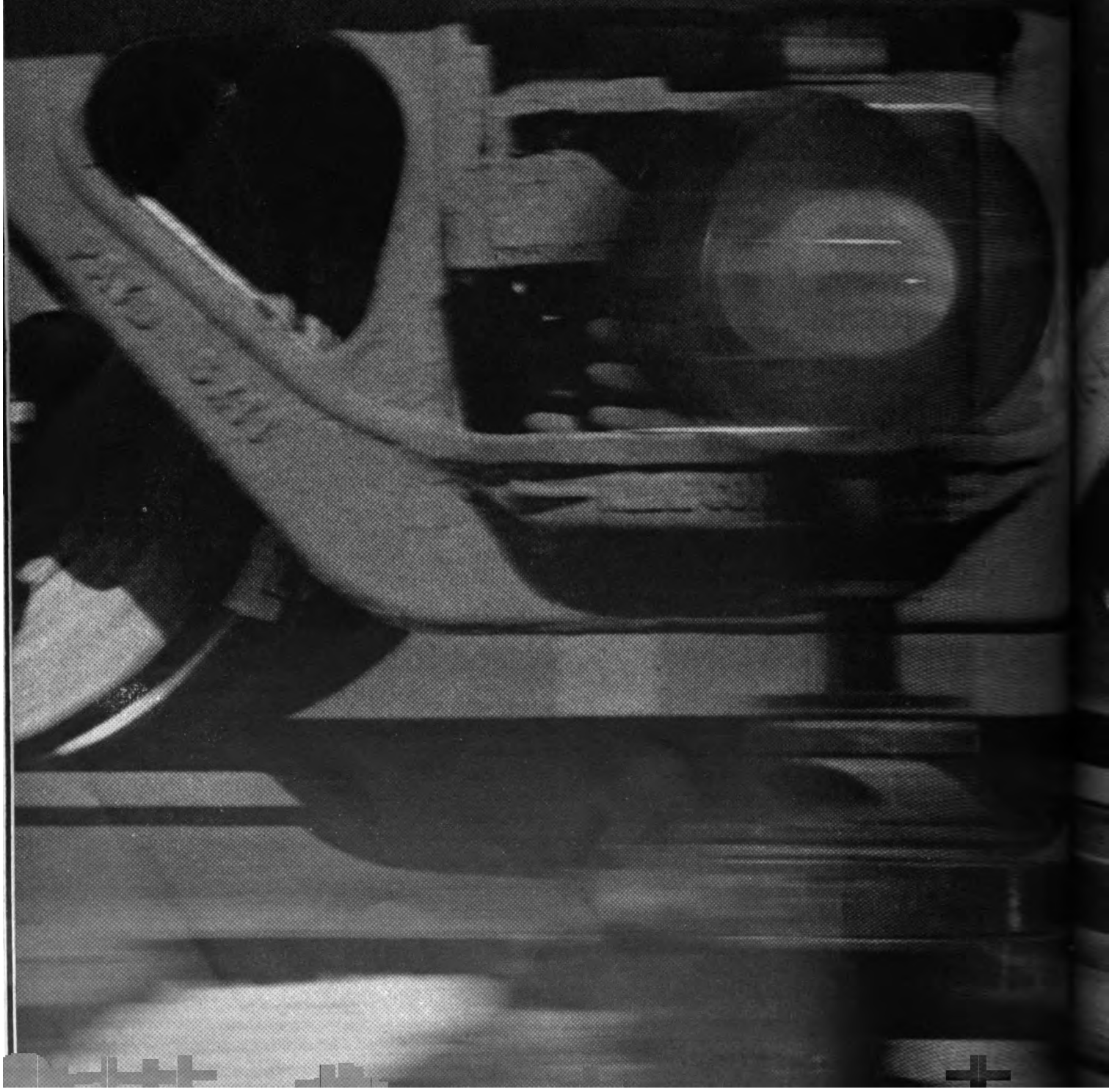
The Union Pacific's announcement on October 25 that it has started road testing the world's first experimental coal-fired gas turbine locomotive is good news. It's good news because it answers in the affirmative the question of whether or not any service evaluation would ever be made of a prime mover in which a large investment of money and time has been expended in its development for railroad application.

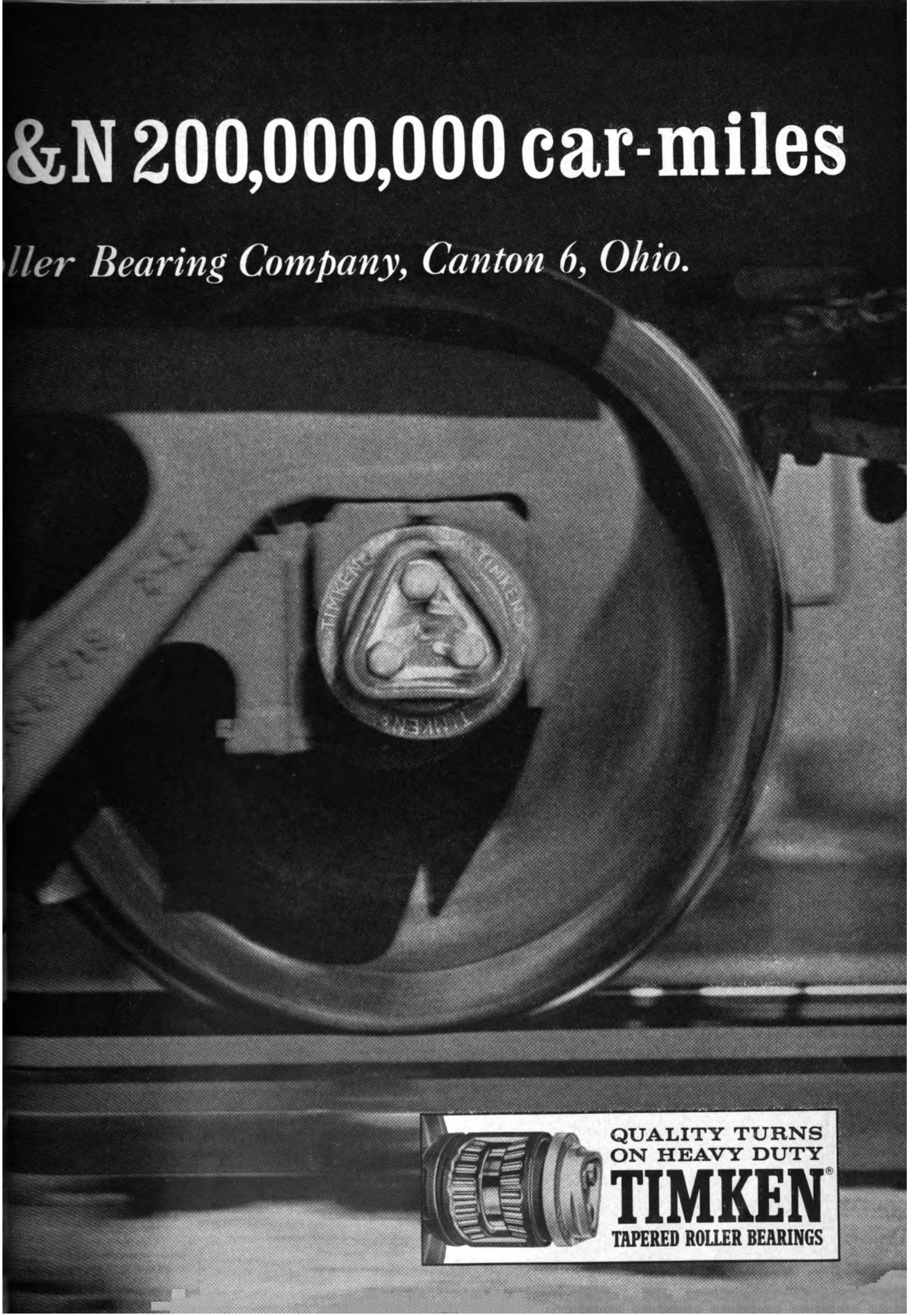
It was in 1944 that leading coal producers and coal-carrying railroads undertook to produce a coal-fired locomotive that could surpass any existing locomotive in economy and operating characteristics. This group formed the Locomotive Development Committee and became affiliated with Bituminus Coal Research, Inc., the nationwide research agency of the bituminus coal industry. Roy B. White, then president of the Baltimore & Ohio, was chairman of the committee. John I. Yellot became director of research and later P. R. Broadley, now mechanical-electrical engineer of the Jersey Central, was in charge of research at the Dunkirk, N.Y. laboratory.

Since that time a great amount of development work has taken place with major problems being in coal pulverization and fly-ash removal. Five years ago, and 12 years after the development work started, it was announced that road tests were "near". After the many disappointments and delays that have occurred there was serious doubt that the prime mover would ever get a chance to demonstrate its value on the rails. We are glad the doubt has been removed.

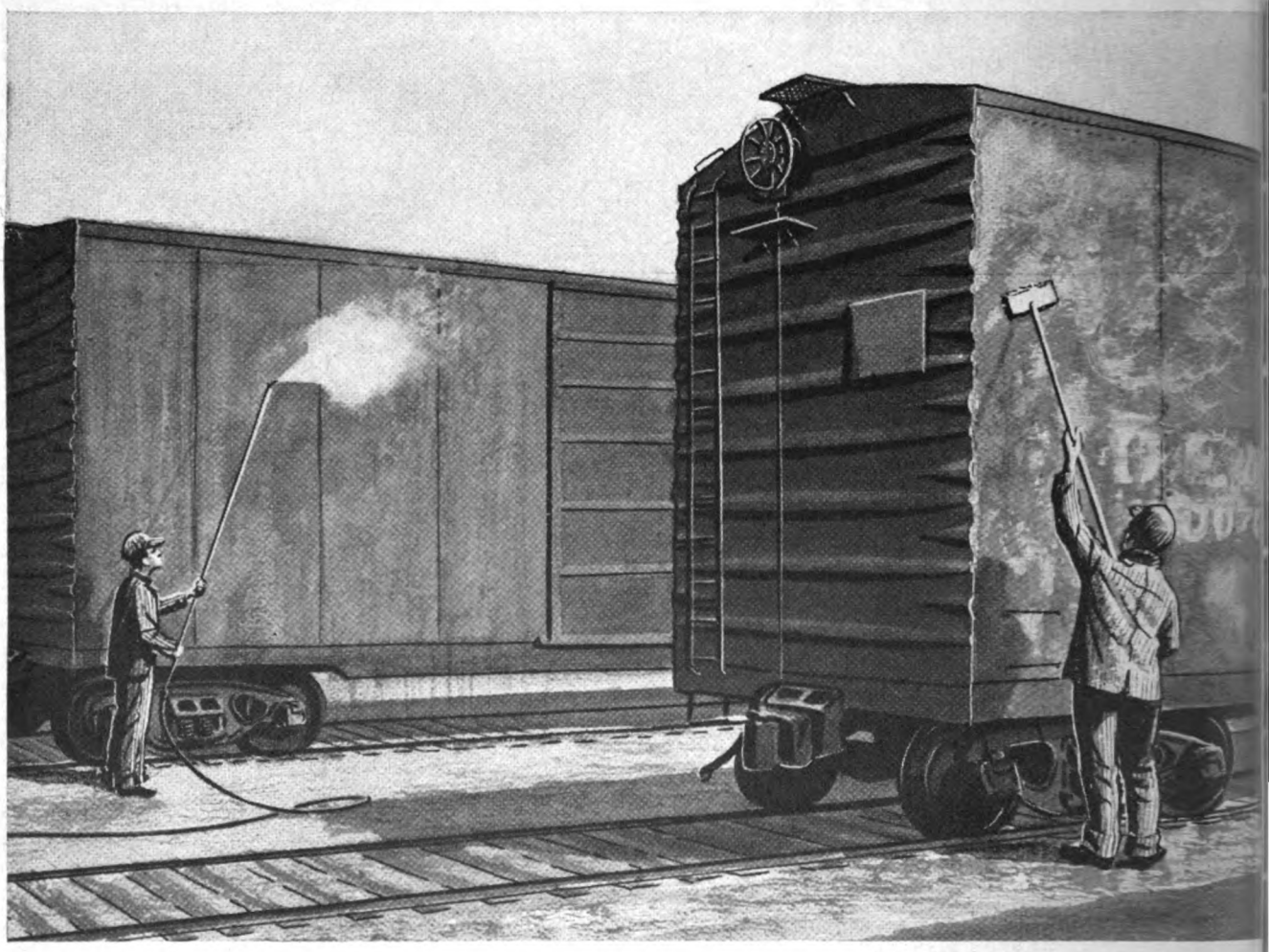
The Union Pacific is a "natural" for this experimental work because it is the only American road operating gas-turbine locomotives. It has 25 oil-fired 4,500-hp units and 30 oil-fired 8,500-hp units, all built by General Electric. The Union Pacific deserves and should get a lot of credit for its willingness to experiment with the coal-fired gas turbine locomotive. Energy in the form of coal is in great abundance in this country and it would be unfortunate if we did not try to find out whether or not it could be utilized successfully and economically in competition with motive power fueled by oil.

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TAPERED ROLLER BEARINGS

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...easy method prepares cars for repainting

Here's how to speed the job of preparing freight cars for repainting. By using Oakite 33, your men avoid sand blasting or chemical stripping in order to get a surface that takes fresh paint perfectly. Cars are merely sprayed with Oakite 33 solution, brushed after it soaks half an hour, then pressure rinsed with water. Car is ready for spot priming and repainting. Oakite 33 removes rust and chalked paint and doesn't strip sound paint that still has good grip.

Oakite engineered methods and materials speed up the hard work of essential railroad maintenance cleaning operations . . . cut the hours involved . . . *add more power to your manpower* . . . give you the important advantage: LOW-COST END RESULTS.

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in the design and manufacture of high-quality railway appliances for the American and Canadian car building industry and railroads

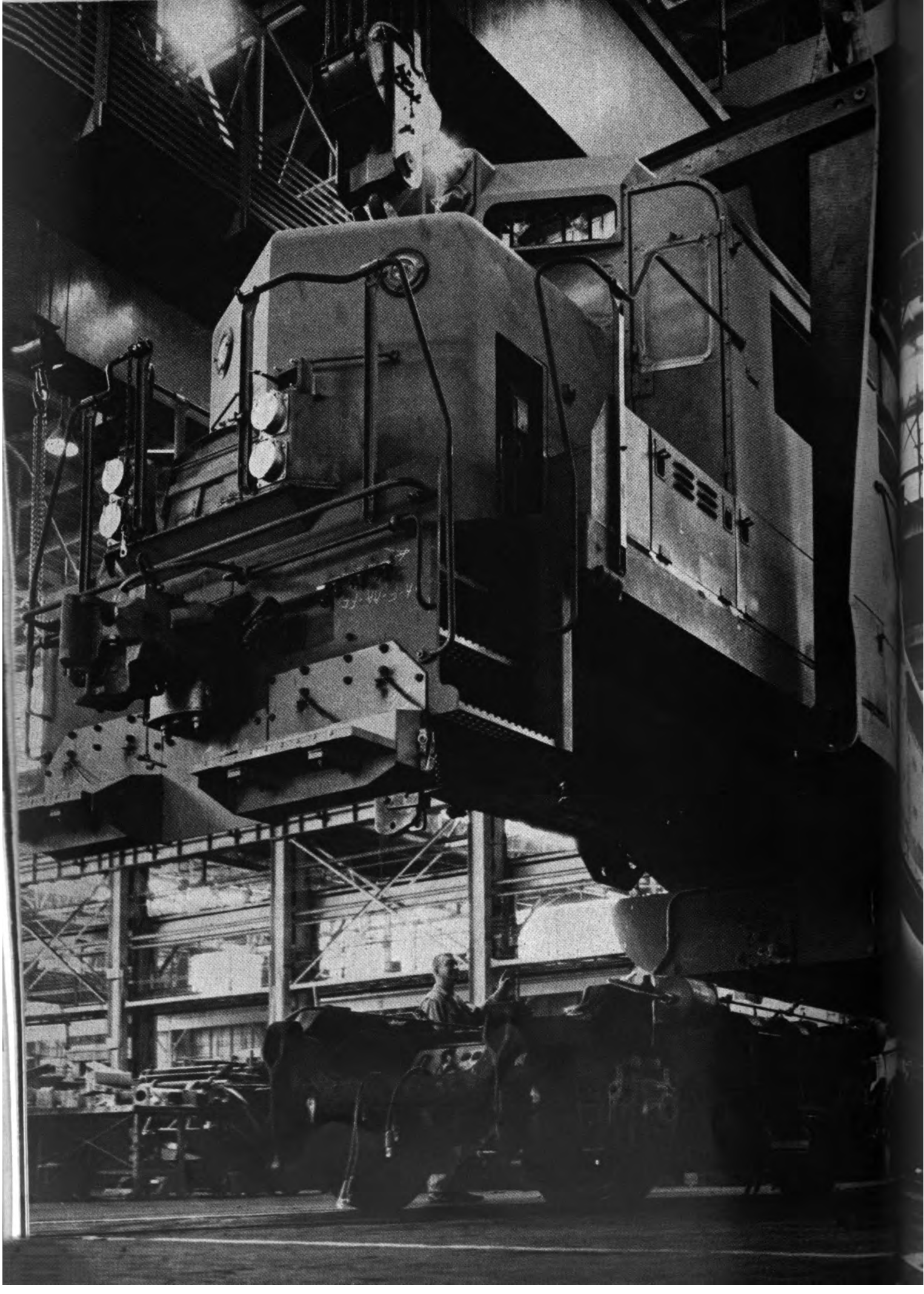


WINE RAILWAY APPLIANCES

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Our 25,000th locomotive... how far have we come?

Our 25,000th locomotive is a significant milestone in the evolution of Diesel motive power on America's railroads. It and the several hundred other GP-30s we are currently building for the railroads are replacing earlier models in a second round of Dieselization.

How far have we come?

Complete Dieselization. The railroad industry has moved from a 100-year era of steam motive power into complete Dieselization in less than 25 years.

Price Per Horsepower. The price per horsepower on our latest model, the GP-30, is actually less than on the first Diesel freight locomotives delivered in 1940, in spite of great increases in labor and materials cost.

Locomotive Capacity and Performance. Horsepower on the basic General Motors 567 series engine, in locomotive application, has been increased from 1350 to 2400. Traction motor horsepower has been increased from 337.5 to 562.5 and the tractive effort (in four-motor freight locomotives) has been increased from 32,400 to 50,000. The newest model main generator has a service life 50 per cent greater than its predecessors. Electro-magnetic electrical control apparatus has replaced less effective, and more costly to maintain, pneumatic controls.

Railroad Investment Return. Improvement of components has so greatly increased locomotive capacity, improved operating performance, and reduced maintenance requirements that today's locomotive — when purchased through Electro-Motive's Locomotive Replacement Plan — offers railroads an even greater return on net cash outlay than when Diesels replaced steam engines.

How did we get here?

Electro-Motive Division's continuing programs of research and development in product and process engineering have been governed by two important philosophies:

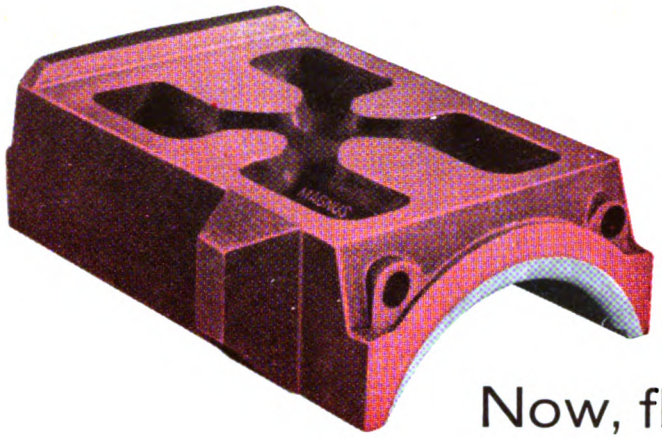
1. **All product innovations must make a superior economic contribution over the product currently offered.**
2. **All product innovations must be applicable to previous models in order to avoid needless physical obsolescence.**

But this is only part of the story. We dedicate our 25,000th locomotive to the railroads of the country, whose judgment and foresight through the years, have made possible the evolution of the Diesel locomotive of today — the revolutionary GP-30, broad range locomotive, ready and able to meet the changing operating conditions on America's progressive railroad systems.

ELECTRO-MOTIVE DIVISION · GENERAL MOTORS

LA GRANGE, ILLINOIS • *HOME OF THE DIESEL LOCOMOTIVE*
In Canada: General Motors Diesel Limited, London, Ontario

Dramatic moment as sub-assemblies, car body and under-frame (as a unit) are placed on trucks, one of the final steps in the manufacture of our 25,000th locomotive.



Now, flat-back bearings are AAR alternate standard – can be applied without restriction to interchange cars. More and more railroads now apply flat-back bearings regularly – to stabilize journals, make rear seals workable, get still more miles per bearing and per hot box setout. Here's how they can improve your bearing performance – and save money, too!

Magnus flat-back bearings effectively stabilize journals during all normal operation—stay seated on the journal and provide uninterrupted lubrication. By limiting fore-and-aft movement, they make rear seals last longer—keep the oil in and dirt out of the journal box. They *cost nothing* to install.

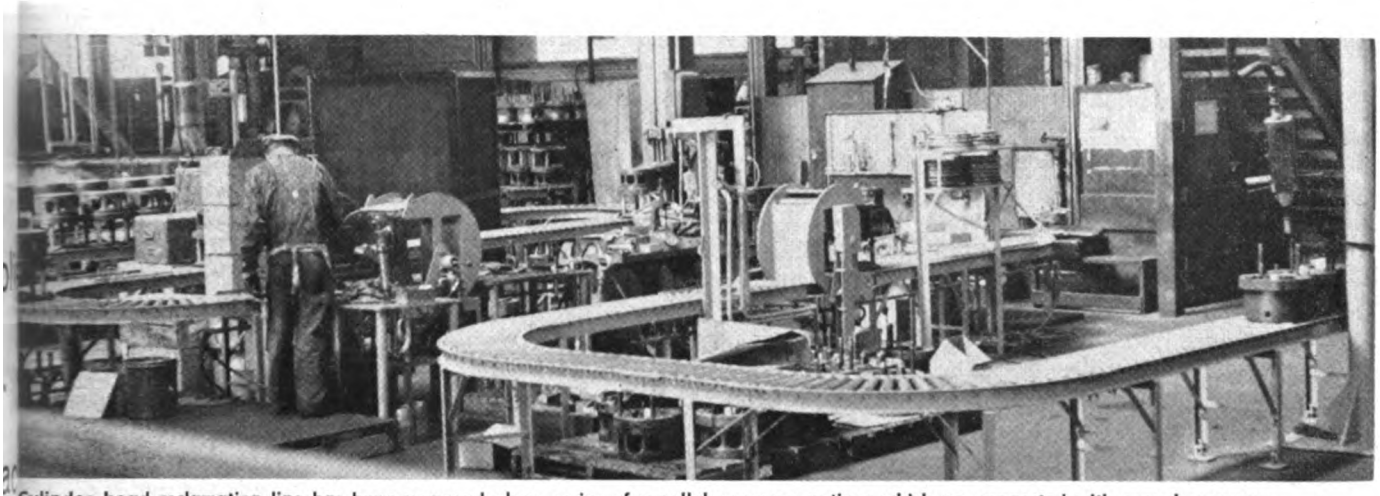
Even now, solid bearings average almost 1,000,000 miles per hot box—cost less to own and operate than the cost of *merely owning* roller bearings. With Magnus flat-backs, it's expected that miles per hot box will reach 2,000,000 or more—and savings too will multiply.



CURRENT ECONOMICS OF SOLID BEARING OPERATION

New economic study updates solid bearing costs as reported by the AAR in 1954. Shows how lubricators have cut these more than half despite very significant rises in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, or to 80 East Jackson Boulevard, Chicago 4.

MAGNUS
METAL CORPORATION
Subsidiary of
NATIONAL LEAD COMPANY



Cylinder head reclamation line has been arranged along series of parallel conveyor sections which are connected with curved conveyors.

Livingston Shop Overhauls . . .



Rebuilt engine at Station 4 on engine assembly will next be transferred to nearby test stand where it will undergo extensive load testing.

. . . and Maintains NP Diesels

Livingston, Mont., Northern Pacific division point approximately half way between St. Paul, Minn., and Seattle, Wash., is the location of the road's heavy diesel repair shop and a maintenance shop which plays a major role in running repair and scheduled preventive work on NP road power. Locomotives on all freight and passenger trains are changed at Livingston where almost one-half of the road's 622 units are serviced and maintained.

The main shop performs classified repairs, including all heavy diesel locomotive repairs for the NP system. This shop also repairs all power assemblies, radiators, engine blowers, governors, and fuel injection equipment. Mileage overhaul, except for rewinding, is done on traction-motor blowers, auxiliary generators, and traction motors. Main generator repairs and traction-motor rewinds are done at South Tacoma (Wash.) shop.

The diesel maintenance shop handles running repairs for road-freight, road-switcher, and road-passenger units, including 36 road switchers assigned on the Rocky Mountain division. Actually, the division has 256 assigned diesel units, consisting of 190 EMD and six Alco units for freight service, 50 EMD passenger units, and 10 switchers, all of which get ICC inspections at Livingston. Many of these locomotives operate well beyond the limits of the Rocky Mountain division, which extends from Livingston westward to Paradise, Mont.—310

miles. Fifty of 52 road passenger units on the entire railroad are assigned to the Rocky Mountain Division for maintenance, but handle almost all NP passenger trains. Passenger units average 15,000 miles per month and freight units accumulate 8,000 to 12,000 miles per month, depending on their assignment.

The road's only wheel-truing machine, under jurisdiction of the diesel maintenance shop, does wheel work on road switchers in branch-line and local service, on yard switchers assigned at points between Billings, Mont., and Missoula, Mont., and to road locomotives. The 44 FT road freight units assigned to the Tacoma Division for maintenance and working in the Livingston-Auburn, Wash., freight pool have wheels trued during layovers at Livingston.

Locomotive maintenance facilities at Livingston are divided into two separate operations—the heavy repair shop and the diesel maintenance shop. The heavy repair shop has 31 stalls in what was formerly the steam locomotive shop. Across one end of this building is a five-track, 225-ft long diesel maintenance shop with its offices and specialized work areas in the adjacent end of the main shop building.

Total expenditure at Livingston for diesel maintenance facilities has been about $1.5 million, of which approximately $1.1 million was spent on the diesel maintenance shop and on the shop housing the wheel-truing machine, both of which went into service in 1957. The balance of $400,000 was spent on tooling and equipping the back shop for diesel engine repairs, converting the boiler shop to an electrical shop, and other changes. Changes are still being made to improve the efficiency of the operation. Currently, a new air-brake shop is under construction.

Locomotives can receive one of the three types of classified repairs in the heavy repair shop:

Class A. Heavy repair with engine removed from carbody and completely rebuilt; main generator reconditioned; repairs to carbody. Made at 6-yr intervals for passenger units; 8-yr intervals for freight units, and 10-yr intervals for road switchers.

Class B. Installation of new crankshaft bearings with engine removed from carbody; reconditioning of air compressor and rotating electrical equipment other than main generator and traction motors; reconditioning of traction control equipment; repainting of road freight and road switcher units. Work repeated at 3- and 4-yr intervals for freight and passenger units, respectively.

Class C. Application of new seals and gaskets and installation of reconditioned power assemblies without removing engine from carbody; inspection and repair of various engine, control, and locomotive auxiliaries; repainting of passenger units. Work repeated at 18- and 24-month intervals for passenger and freight units respectively.

The Class B repair includes, in addition to the items specified, all work done during the Class C repair. For the Class A repair, work called for in the B and C classifications is also performed.

An outstanding feature of the heavy-repair shop where all this work is done is the diesel engine line with its component part areas channeling inspected and repaired parts in for progressive engine assembly. The line has four assembly positions and a fifth station where the engine is put on load test and receives final adjustment. Assigned to this line are four to six machinists, two helpers, and an apprentice.

After the engine is removed from the diesel unit for rebuilding, it is placed on two dollies to be stripped. Water and oil pumps, gear trains, accessory drives, and harmonic balancer are removed from the front end. On the rear, the blowers, camshaft trains, and housings are removed. After the splice bolts are removed, separating the A-

Classified Locomotive Repairs

Class C Repair
Engine Not Removed from Carbody

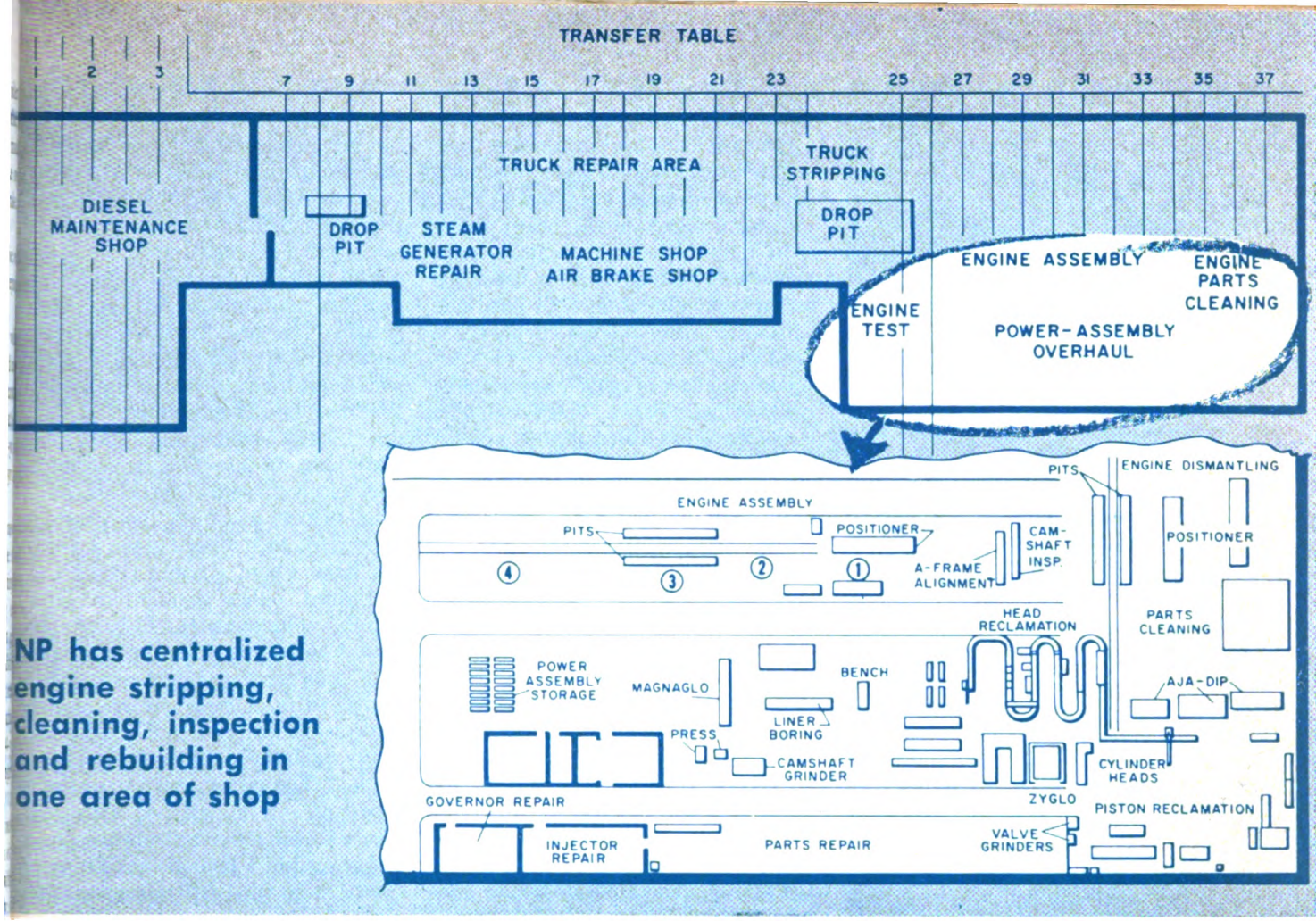
- Replace head seals, gaskets, liner seals and exhaust-manifold gaskets.
- Clean air box and oil pan.
- Recondition cylinder head assemblies, cylinder liners, piston assemblies (renewing all compression and oil rings), piston carriers and pins, connecting rods, injectors, and engine-blower assemblies.
- Remove and inspect all lower main bearings, also removing and inspecting all upper main bearings if lower shell inspection indicates it advisable.
- Inspect and repair water and lubricating-oil pumps.
- Inspect radiator assemblies and blow accumulations out of radiators.
- Replace Vernatherm bulb assembly and calibrate Vernatherm.
- Clean and inspect air compressor heads, valves and crankcases, the lubricating-oil cooler and the relief valves in Michiana filter housing.
- Check alignment of main generator and air compressor.
- Inspect and lubricate, make necessary repairs to power contactors, renewing seals.
- Recondition fuel-pump, cab-heater, and defroster motors.
- Paint road passenger units.
- Examine and repair steam-heat end valves on passenger units.

Class B Repair
Engine Removed from Carbody

- Install new main bearings and crankshaft thrust collars.
- Check valve timing with dial indicator for out-of-limit wear in camshaft gear train.
- Renew spring packs in harmonic balancer.
- Inspect and clean header screens.
- Recondition air compressor.
- Recondition dynamic-brake blower motors.
- Check control and high voltage circuits with Allen ground detector.
- Inspect and make necessary repairs to engine - cooling - fan assemblies, traction-motor-blower assemblies, and auxiliary generator.
- Lubricate and renew seals and gaskets in reverser, cam switch, field-shunting contactor and braking contactor.
- Inspect and make necessary repairs to magnet valves.
- Inspect and make necessary repairs to draft gear and buffer rigging.
- Paint freight and road-switcher units.

Class A Repair
Engine Removed from Carbody

- Completely dismantle diesel engine for thorough cleaning and inspection of crankshaft sections, oil pan, crankshaft, camshafts and all component parts.
- Recondition main generator and alternator, traction-motor-blower assemblies, engine-cooling-fan motors and auxiliary generator.
- Clean, inspect and make necessary repairs to all electrical equipment.
- Make necessary repairs to carbody.
- Remove, clean and examine side-wall water tanks on passenger units.



NP has centralized engine stripping, cleaning, inspection and rebuilding in one area of shop

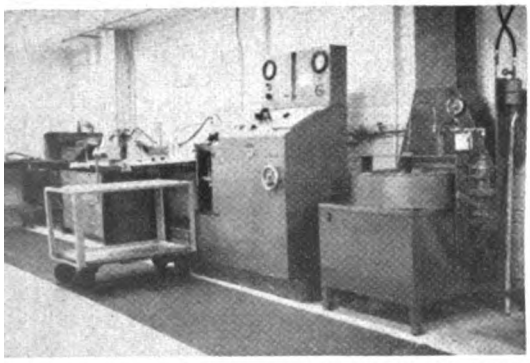
frame from the oil pan, the A-frame is bolted on an engine turnover jig. With the A-frame in the upright position, the power assemblies, camshafts, and cylinder-head cover frames are removed. The engine is then inverted and the crankshaft removed. Two to four men are used in stripping. A jib crane is used for removing power assemblies. The oil pan is sent to the cleaning booth. Following cleaning, it is inspected. Cracks or other defects are then repaired, and the oil pan goes to the paint shop for repainting inside.

The A-frame is removed from the first turnover, placed on a portable turnover, and set in the cleaning booth. After cleaning solution is applied, the frame is rinsed with a jet cleaning device which sprays it with a solvent, hot water and steam. The A-frame, still on the portable turnover, is placed on the shop floor and inspected visually, following which it is tested under 90 psi water pressure. With fluorescent penetrant applied around the liner bores, crankshaft pedestals, and camshaft pads, black light is used to detect cracks. A wire buffer is then used on the main bearing pedestals and camshaft pads on the upper deck.

In the first assembly position, the A-frame is removed from the portable turnover and placed on the floor. Main bearing caps with shells in position are applied, torqued, measured, and brought within limits. Serrations are checked for bottoming. A cast-iron alignment bar, covered with light machine oil, is positioned and the bearings scraped to proper size, if required. The frame is then flushed with a high-pressure washing machine. At the second position on the line, the A-frame is placed on a stationary turnover and the crankshaft is applied. End thrust is checked and bearing caps are torqued to final position. Camshafts, lay shafts, and cylinder-head-cover frames are applied. At this position, the A-frame is set on the reconditioned oil pan which has been moved in and placed on dollies. The A-frame is torqued down on the oil pan.

The third assembly position involves application of power assemblies, front and rear gear trains, water and oil pumps, overspeed trips, rear-end housings, blowers, rocker arms and injectors. Backlash is checked and the engine is timed. A 50-psi water test is applied and held for eight hours. At the fourth position the fuel lines are checked at 30 psi. An air motor is applied to the flywheel end of the chankshaft and the engine rotated under 30-psi oil pressure for about one hour. The entire engine is checked for proper oiling. After the engine's exterior is painted and stenciled, it is placed on the test stand.

First step in the load test is a 50-psi fuel leak-off test. Oil and water levels are checked. The engine is then started and checked for leaks. After making certain that air-box drains are open, the engine is again operated under load, checking for proper temperatures in main and connecting rod bearings. The engine is first operated in Idle throttle position for 5 min and bearings checked. It is then run for 10 min in Idle and again shut down for a bearing check. After this, it is run for 30 min under load in Run 2 position and bearings are again checked. Then it is loaded and operated for 30 min in Run 5 position and for 30 min more in Run 6. Following this, overspeed-trip operation is checked. The engine is then operated on the following loads: 30 min in Run 7, 30 min in Run 8, 20 min in Run 6, 30 min in Run 8, 20 min in Run 6, 60 min in Run 8, 20 min in Run 6, 60 min in



Injector test room equipment includes spray-pattern analyzer, Unitest machines, and shop-built tip-testing machine.



Injector undergoing inspection is calibrated on Unitest where quantity of fuel oil it delivers is carefully measured.



Lubricating oil control laboratory tests all crankcase samples from locomotive units assigned to Livingston for maintenance.

Run 8. After this, the engine is shut down, oil temperature is checked with a pyrometer, and the crankcase is thoroughly inspected. Power assembly components are again torqued.

Other features in the heavy repair shop include the fuel injection equipment room with devices for repairing, testing and calibrating both Alco and EMD fuel injection equipment, and a production line, complete with conveyors, for testing and reconditioning EMD cylinder heads. This installation is similar to the Milwaukee Road's arrangement at its Milwaukee, Wis., shops (RL&C, Nov. 1959, p 19), except that the conveyor lines are curved into parallel segments because of space limitations. The reclamation area for EMD pistons utilizes the spray-babbitt process. The engine governor room is equipped with the Woodward governor test stand. A section on a balcony above the machine shop is being equipped for air-brake repair and testing.

Also on the balcony is a complete lubricating-oil control laboratory which follows the crankcase oil condition of all locomotives assigned to Livingston. The laboratory also analyzes crankcase lube-oil samples for all switching and road-switcher units assigned at points from Mandan, N.D., to the west end of the Northern Pacific. Diesel units east of Mandan have crankcase oil samples checked by the St. Paul laboratory. NP officers say these laboratories have been very beneficial in pinpointing difficulties with oil filtration, fuel and water dilution, and other factors of engine operation or maintenance.

Equipment in the fuel injection equipment repair room includes two Unitest calibrating machines for checking fuel delivery—one for EMD injectors and the other for Bosch and Bendix fuel pumps; a spray-pattern analyzer; and a shop-made injector-tip test machine. Fuel delivery of EMD injectors is checked at 275 strokes per min at a 1.624-in. fuel rack and again at 800 strokes per min with a 1.00-in. fuel rack.

The spray-pattern analyzer checks spherical and needle valves for leaks and determines the condition of the holes in the injector tip. Any deviation from the circular spray denotes a faulty tip. Popping pressure, also measured, should be in the range of 1,200 to 1,500 psi—not less than 1,000 psi.

On the injector-tip test machine, air is delivered to the tip at 5 psi. New tips are used as a calibration standard, with comparison made on a mercury column. Tips having oblong or oversize holes deliver more fuel and fall out of the differential range. A $1/16$-in variation in the mercury column can give 2 cc additional or less fuel oil per stroke. The test machine facilitates selection of tips that will bring injectors within the delivery range needed to pass the Unitest calibration.

On the piston reclamation line, EMD pistons are first disassembled and cleaned with caustic solution. One helper does all the cleaning. Pistons are then moved to the regrooving lathe where grooves are cleaned and sized, either standard or 0.030 and 0.060 in. oversize. They are then placed in a three-tier portable rack with sizes separated, and moved to a Pangborn machine where interiors of crowns and exteriors are grit-blasted. Spray babbitt, 0.002 in. thick, is then applied. The pistons are cleaned with Stoddard solvent, cleaned with compressed air to remove all abrasive dust, and placed in a tank of lubricating oil for 20 to 30 min. After draining, each piston is wrapped in paper and boxed. Reclamation costs about 50 cents per piston.

For testing and reconditioning EMD cylinder heads there is a production line, complete with conveyors. The cylinder heads are placed on special racks beside the engine as it is dismantled. They are then cleaned in a caustic solution. Next, they are placed on the line where springs, keepers, and valves are removed. A 100-psi water test is made, the entire head buffed and Magnafluxed. Heads rejected at the water or Magnaflux tests are set aside for repair. Valve guides are then removed. If the cylinder head is sound, new guides are applied and valve seats ground. After the application of valves, springs and keepers, the cylinder head is ready for service.

Defective cylinder heads are sent to the welding booth, pre-heated to 1,300 deg F in an oven which supports the head and revolves so that downhand welding can be done. Cracks detected before heating are ground out, while those appearing while heating are melted out with an oxyacetylene torch. Welding is done with a molybdenum cast-iron rod and cast-iron flux. The injector hole is welded at the same time. After welding, each head is

ed in an insulated, closed con-
r for cooling and allowed to re-
1 overnight. In the next opera-
the head is centered in a jig on a
ng machine and refaced. A jig is
to center the head in a radial drill
s where the valve seats and in-
r holes are bored. The heads are
placed back on the assembly line,
ted, valve guides applied, valve
s ground, and valves applied. Re-
ation of an EMD cylinder head
welding and remachining costs
it $10.

ntenance Shop

he diesel maintenance shop at the
h end of the heavy diesel repair
has five servicing tracks. Tracks
4 are designated as running
tenance tracks. Track 5, which
an overhead crane, handles six-
ith and annual ICC tests, and re-
s involving replacement of radia-
, compressors, oil coolers and
er assemblies. Class C repairs are
made in this shop. Main genera-
or engine change-outs are done in
main shop.

Diesel units in road service are
n trip maintenance every seven
s. Road switcher units in passen-
service, and those in any other
ice that exceeds 4,300 miles per
nth, are given trip maintenance
y 15 days. All road switcher units
ther than passenger service where
mileage is less than 4,300 miles
month are given trip maintenance
y 30 days. Each locomotive is re-
ed to its assigned maintenance
it for quarterly inspection and test.
aintenance record, based on trips,
ept on each unit. The form lists 96
s, with lead readings called for at
os 24, 48, 72 and 96.

A 50-ton drop table for single pairs
wheels and a 150-ton drop table for
plete trucks in the heavy repair
p are available to the diesel mainte-
ce shop. In the main shop, a track
equipped with overhead racks, is
ilable for Class C repairs involving
lacement of complete engine sets of
ver assemblies. The diesel mainte-
ce shop overhauls all steam genera-
, including change-outs and in-
lation of replacement steam gen-
tors. The diesel maintenance shop
n three shifts, seven days a week.
ervices 65 units daily in winter and
per day in summer with a force of
). Running repair is an important
se of the Livingston operation.

L&N 100-Ton Box Cars Based on PS-1 Design

Nominal 100-ton, cushion-underframe box cars, based on Pullman-Standard PS-1 design, are being built for the Louisville & Nashville. While other railroads have 100-ton box cars, Pullman-Standard officers say this is the first mass-produced order for cars of this capacity. The 50 cars are now being built at the P-S plant in Bessemer, Ala.

The L&N is pioneering with these cars, which they will designate "Cushion-Cargo," just as they are with the 100-ton coal hoppers equipped for automatic unloading (RL&C, April 1962, p 22). In addition to their high capacity and hydraulic cushioning, the cars feature aluminum doors and roofs.

This L&N box-car order followed a survey of shippers which indicated need for greater capacity to take advantage of recently published rates giving incentives for loading in excess of the standard minimum of 50,000 lb. A large number of the cars will be used in hauling newsprint. Other ladings will include ammunition, gypsum board, tire fabric, lubricating oil, valves and fittings, tin plate and beer, all of which require extra safeguards in transit.

In the underframe, the buffing, or sliding, center sill consists of two Z-26, 41.2-lb sections, with top flanges seam welded full length on the outside. Semi-automatic welds from the inside provide for 100% penetration the full length of the sill. The draft-gear pockets are formed of P-S welded draft lugs and welded strikers designed to receive the special Type-E-head, Type-F-butt couplers modified for 43-in. length from pulling face to center line of the pin in the Y-45 yoke. A cast-steel kingpin housing and body center plate is used.

The stationary center sill, a pair of inverted Z-26, 31.3-lb sections joined by a 21- x ¼-in. cover plate welded to the top flanges, is tied across the bottom by the body center plate and center filler castings at the bolsters and by 8-in. 22.8-lb channels at the crossbearers.

The Tri-Ten body bolsters are a welded design with ⅜-in. web plates. The 7/16-in. top cover plates, 27 in. wide, extend from side to side of car. Each is stiffened by two ¼-in. pressed hat sections. The ½-in. bottom cover plate, 25 in. wide, is welded to the side sill and to the bottom flange of the stationary sill. Side-bearing braces are 5/16-in. inverted U-shape pressings welded between the bolster webs.

The four crossbearers are welded Tri-Ten, with ¼-in. web plates and 5/16-in. top cover plates extending over the center sill from side to side of car. The 5/16-in. bottom cover plates extend from the car sides and are riveted to the 8-in. 22.8-lb stationary-sill tie channel. Tops of the crossbearers are contoured to permit stringers to pass over them.

The six floor beams, located between the bolsters and crossbearers and between crossbearers, are 6-in. 12.5-lb I-beams. Two additional floor beams are provided at each end of the car between bolster and end sill. The 4-in. 7.7-lb I-beam floor stringers, three on each side of center sill, extend between the bolsters and from bolsters to end sills. While the stringer next to the side sill is full length between bolsters, the center stringer is omitted at both sides of the bolster to clear the 36-in. wheels required on these 100-ton cars. The stringer next to the center sill is not continuous in this area, having the portion over the wheel moved closer to the center sill to provide clearance.

Side Construction

Sides are P-S arc-welded design, with the side sheets butt-welded at, and to, the outer flanges of the Z-bar side posts. The sheets are placed outside and continuously welded to the side plate and side sill, but are riveted to door and corner posts. Side sheets are 0.075-in. Cor-Ten, except that 3/16-in. copper-bearing sheets are used adjacent to the doorways. The AAR 9.9-lb W-section side plates are reinforced over the doorway by a 5½ x ⅜-in. bar attached both to side plate and to the aluminum roof with countersunk-head Huck bolts. Button-head Huck bolts are used for roof attach-



Paper is primary product to be transported in high-capacity cars. Incentive rates have raised average L&N paper load from 33 to over 70 tons per car. Hydroframe-60 cushion underframe, with which all cars are equipped, is important for double-tier stowing of paper.

ment beyond the side plate reinforcement. Side sills are 6- x 6- x $\frac{5}{16}$-in. Tri-Ten rolled angles extending from end to end of car. The side sill under the doorway is reinforced with a 15- x 3- x $\frac{5}{16}$-in. pressed Tri-Ten angle extending from bolster to bolster and having the 3-in. flange welded to the bottom of the side sill. This reinforcement tapers to an 8-in. depth through the bolster area and extends to the end sills. Of the 16 intermediate side posts on each side, 12 are 3-in. 5.1-lb Z-bars, and the two over each bolster are 3-in. 6.7-lb Z-bars. Corner posts are 3-in., 5.1-lb Z-bars. Door posts are box sections formed of ¼-in. plate with round-bar lading anchors. Door-post gussets are ⅜-in. plate applied outside. The car is equipped with 68 hook-on lading anchors.

Car ends are in two sections, welded at the center seam and riveted to the sides and end sills. The roof is attached with Huck bolts. The bottom end section is formed of 0.1793-in. sheet and the top section of $\frac{5}{32}$-in. material. Wood furrings for applying the end lining are secured with ½-in. welding studs. End sills are 6- x 3½ x $\frac{5}{16}$-in. angles. The extra end sill and stationary sill attachment consists of another 6- x 3½ - x $\frac{5}{16}$-in. angle with a $\frac{5}{16}$-in. pressed plate. The horizontal legs of the side and end sills are joined with ¼-in. gussets. The ¼-in. top corner caps, formed to reinforce the top corners of the car, are Huck bolted to the aluminum roof and riveted and welded to the steel ends and sides. At each end of the car are four P-S ventilators with baffles.

The aluminum roof consists of flanged 0.081-in. sheets joined within hairpin-type seam caps with cold rivets. Roof-sheet flanges extend down over the vertical legs of the side plates and over the faces of steel ends where they are attached with Huck bolts. Seam caps, pressed from No. 12 gage galvanized steel, are flanged down to be secured to the vertical leg of the side plate with Huck bolts. Seam caps are spaced on 41-in. centers to accommodate standard lengths of running board. The 10-ft single, sliding side doors are also aluminum. Loader equipment consists of five belts, 8 ft 5½ in. long.

Decking is 2-⅜-in. hickory Doweloc in the doorway; the remainder of the floor, oak Doweloc. Each Doweloc panel is secured with eight bolts and floor clips. Finished side and end lining is $\frac{25}{32}$- x 3¼-in. Southern pine, tongue-and-groove. The 32 intermediate side lining nailers are 2¾ - x 3-in. section, each secured to the web of the intermediate side post Z-bars with 2½-in. bolts and to door posts with ½-in. welding studs. Side and end lining is nailed to the furrings with 2½-in. No. 8 galvanized flat head nails, two to a board at each crossing.

One coat each of primer and blue freight-car paint is applied to the underframe. One coat of primer, followed by one coat of blue hot spray freight-car-finish paint, is applied to the exterior sides and ends with hydraulic airless spray equipment. Exteriors and interiors of the aluminum roof and side doors are not painted. One coat of primer is applied to the interior sides and ends. The DF belt rails and surfaces of the side and end linings receive one coat of aluminum paint.

The narrow pedestal spring-plankless trucks have 3-$\frac{11}{16}$-in. travel springs, 6½ - x 12-in. roller bearings, double-roller side bearings, and 36-in. wrought-steel wheels. Axles are alternate standard, double normalized and tempered, and are machined to body finish between the wheel seats. The truck center plates are lubricated with a mixture of mineral spirits and molybdenum disulphide powder.

Principal Dimensions and Weights

Length inside, ft-in.	60 - 9$\frac{1}{16}$
Length over end sills, ft-in.	60 - 11¼
Length over striking plates, ft-in.	67 - 11¼
Truck centers, ft-in.	41 - 3
Width inside, ft-in.	9 - 4$\frac{1}{16}$
Width over side sill angles, ft-in.	9 - 11$\frac{5}{8}$
Width over door fixtures, ft-in.	10 - 8
Height, inside floor to side plate at lining, ft-in.	10 - 10
Height, rail to top of running board saddles, ftin.	15 - 3$\frac{25}{32}$
Capacity, cu ft	6,146
Light Weight, lb	77,000
Load Limit, lb	186,000

Partial List of Suppliers

Truck frames and bolsters	American Steel Foundries
Side bearings	A. Stucki
Roller bearings	Timken Roller Bearing
Stabilizer parts	Standard Car Truck
Pedestal adapters, coupler yokes	National Castings
Couplers	Symington-Wayne
Draft gears	Cardwell-Westinghouse
Brake shoes	Standard Brake Shoe & Fdry.
Brake-beam wear plates	Unit Truck
Hand brakes	Universal Railway Devices
Running boards, brake and cross-over steps	Apex Railway Products
Side doors and fixtures	Camel Sales
Loader equipment	Evans Products
Slack adjusters	American SAB
Flooring	D. B. Frampton
Anti-skid compound	J. W. Mortell

How Lading Damage Can Be Reduced

By W. M. Keller

There are several basic elements to consider in evaluating damage to rail-hauled shipments. The main one is acceleration, or gravity (G) as it is called when expressed at the rate of 32.2 ft per sec per sec. Unless a certain rate is exceeded, no damage results. An acceleration is necessarily present in every movement, or trains could not be started and stopped. When this acceleration is low, it causes no damage to shipments.

Accelerations occur in three planes —lateral, vertical, and longitudinal. Accelerations in any two or three of these planes can be combined to produce accelerations in angular directions. So long as the accelerations are continued in one direction, they can be relatively high without causing trouble. When they are suddenly reversed, impacts are produced.

Some years ago when it was recognized that the ride of freight-car trucks could be improved, several new designs were developed. Road tests were made to determine the merits of these designs, and the improvements were adopted as standard. Tests showed these designs would be conducive to reducing lading damage that might result from lateral or vertical accelerations. It is recognized that severe longitudinal shocks are not the result of truck conditions.

Improved ride required adoption of springs with travel of 2½ in. or more. Because these "softer" springs are more likely to develop harmonic actions, a snubber was incorporated in the system. All of these changes have resulted in smoother riding trucks. When acceleration of high magnitude, combined with high frequency, is encountered, conditions which are conducive to damage may develop. Acceleration frequencies vary with truck characteristics and the roadbed. As a general rule, freight-car body accelerations with soft springs of 2½ in. or greater travel are in the range of 0.25 G to 0.50 G vertically and of smaller magnitude laterally. Frequency of the vibration or acceleration is of the order of 2.5 to 3.0 cycles per sec. Perhaps the highest frequency is 7 cycles per sec. In newer trucks with soft springs, the frequency is about 1.5 cycles per sec.

Additional research needs to be done to further improve riding qualities; some of this is now under way. The improvement in ride of trucks has been significant, and damage from this cause has been greatly reduced.

In addition to shocks or accelerations from trucks moving over the rails, there are longitudinal, and sometimes vertical, accelerations which result from coupling impacts. Most of the severe longitudinal impacts occur in switching and from the slack action of couplers and their attachments in moving trains. Accelerations of undesirable magnitude occur when velocities are changed too quickly. Two conventional draft gears have a total movement of 5½ in. before going solid. It is easy to see that, when a car moving at 10 mph strikes a standing car or train, the speed of the moving car must be reduced from 10 mph—14.67 ft per sec—to zero very quickly. The distance in which this is accomplished is the 5½ in. of standard draft-gear travel when the car is coupled to a train with set brakes.

To illustrate the effect on lading at this speed, assume a box car with canned goods in boxes has a total lading weight of 100,000 lb. At 10 mph, this lading has a kinetic energy of 352,000 ft-lb. When a body weighing 100,000 lb is moving at a speed of 10 mph, it requires a force of 352,000 ft-lb to stop it. If this energy is dissipated in 12 in., the average stopping force is 352,000 lb. If it is stopped in half this distance—6 in.—the average retarding force doubles, becoming 704,000 lb. In a general way, this illustrates why the draft-gear travel is helpful in reducing shocks both to car and lading.

The most effective way to cushion longitudinal shocks is to give the carbody a little more stopping space—precisely what is done in cushion underframes. Cushion underframes have a coupler movement of, roughly, two to five times that of two conventional gears. One limitation of the cushion underframe is its first cost. Studies are under way to determine what advantages may be obtained by what might be called an intermediate step between the cushion underframe and the conventional draft gear. Tests now being made on new type draft gears and cushion underframes, it is hoped, will show what protection is needed for various commodities.

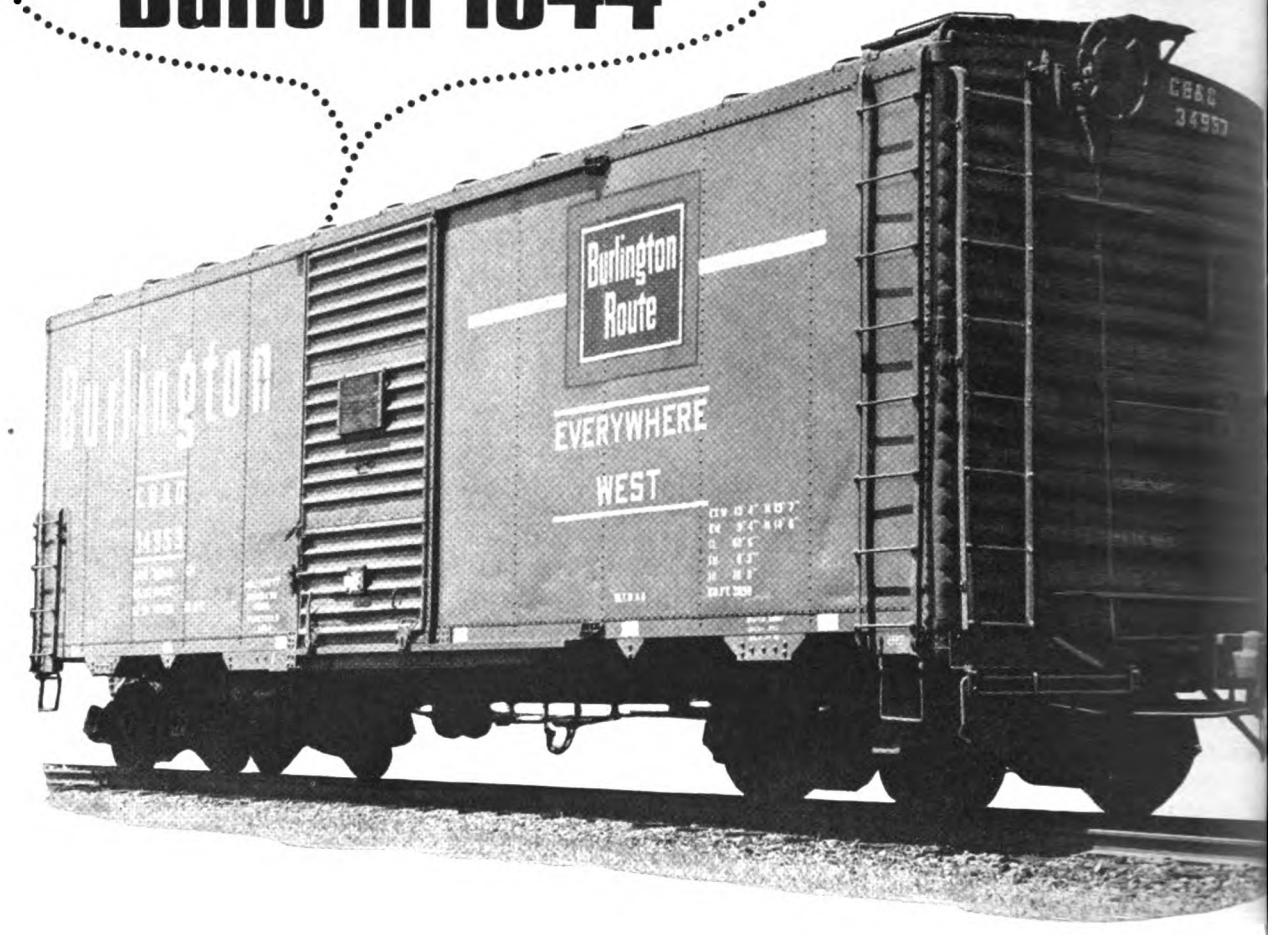
The type of lading has an effect on the damage that may result from overspeed impacts. No lading damage, except loss, ever results to coal, ore, iron billets, gravel, sand, loose grain, and liquids in tank cars. These may be classified, generally, as the type of lading undamageable by even abnormal impacts. The next group, which cannot be damaged without extremely rough handling, are such materials as heavy steel shapes, steel castings, forgings, heavy steel pipe, and lumber. Then there is the group of rather easily damaged shipments, such as food products in glass and metal containers, furniture, automobile windshields, light machinery, melons, tomatoes, dishes, and ceramic tiles. If it were possible to segregate cars for loading and if the desired car distribution could be accomplished, it would be easy to select cars with the type of draft gear best suited for various types of lading shipped. Assigned service cars are probably the best way to accomplish this objective. As a general rule, it could be expected that any improvements obtainable in draft-gear design should first be used in box and refrigerator cars. This is what is being done.

There are several thousand cushion-underframe cars now moving in interchange service. If railroads can justify their cost, either in reduction of lading damage or reduced car repair costs, there will undoubtedly be more. Any equipment cost must ultimately be reflected in the cost of the service. Because the railroad industry has done a remarkable job of holding freight rates stationary during an inflationary period, it is important to use expensive items only where they are essential to good service. Savings from draft-gear protection must be substantial to justify the costs involved. As a hypo-

(Continued on page 40)

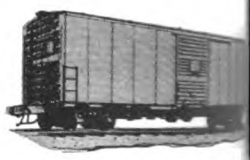
From a paper presented by Mr. Keller, vice-president research, AAR, before a recent meeting of the Railway Systems and Management Association in Chicago.

Built in 1944



In 1961 — One

Cushioned Cargo Cars





In Service



This CB&Q boxcar is typical of a "new generation" of veteran railroad cars. After 18 years in service, in 1961 the Burlington brought the car up to the latest Gliding Ride standards by installing National 3C* Gliding Sills. Now number 34953 has taken its place alongside the most modern cars in existence . . . has taken a new lease on revenue-producing life, as proven by over 15 months in service with virtually no lading damage.

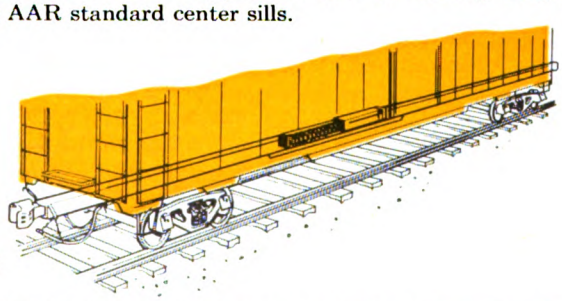
This actual case history is important to all railroads and all car operators for this reason: National 3C Gliding Sill points the way to reducing crippling damage claims . . . makes bad-order cars from end-to-end impacts a thing of the past.

Because the 3C hydraulic unit responds *only* to dynamic forces, it operates *only* when shock protection is needed. Rubber draft gears, which operate in *buff* or *pull*, provide all necessary protection for the sill during train operation. Thus the National 3C provides optimum cushioning protection to lading, car structure, trucks and journals.

Change Ride to Glide with the National 3C Gliding Sill in all your new or existing cars having AAR standard center sills. It will help you banish the twin bugaboos of damage claims and damaged cars.

of the Finest

NATIONAL 3C GLIDING SILL increases efficiency by delivering damage-free merchandise — changes Riding to Gliding through its hydraulic shock absorbing-cushioning action. The National 3C Gliding Sill can be applied to new or existing freight cars having AAR standard center sills.



***Cushioned Cargo Car that Cuts Cargo Claims**

PRIDE IN PROGRESS P R I MEMBER

International Division
Cleveland 6, Ohio

National Castings Company of Canada, Ltd.
66 Portland St., Toronto 28, Ontario

Transportation Products Division
Cleveland 6, Ohio

NATIONAL CASTINGS COMPANY
Cleveland 6, Ohio

A-8031A

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • JOURNAL BOXES • ROLLER BEARING ADAPTERS • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM

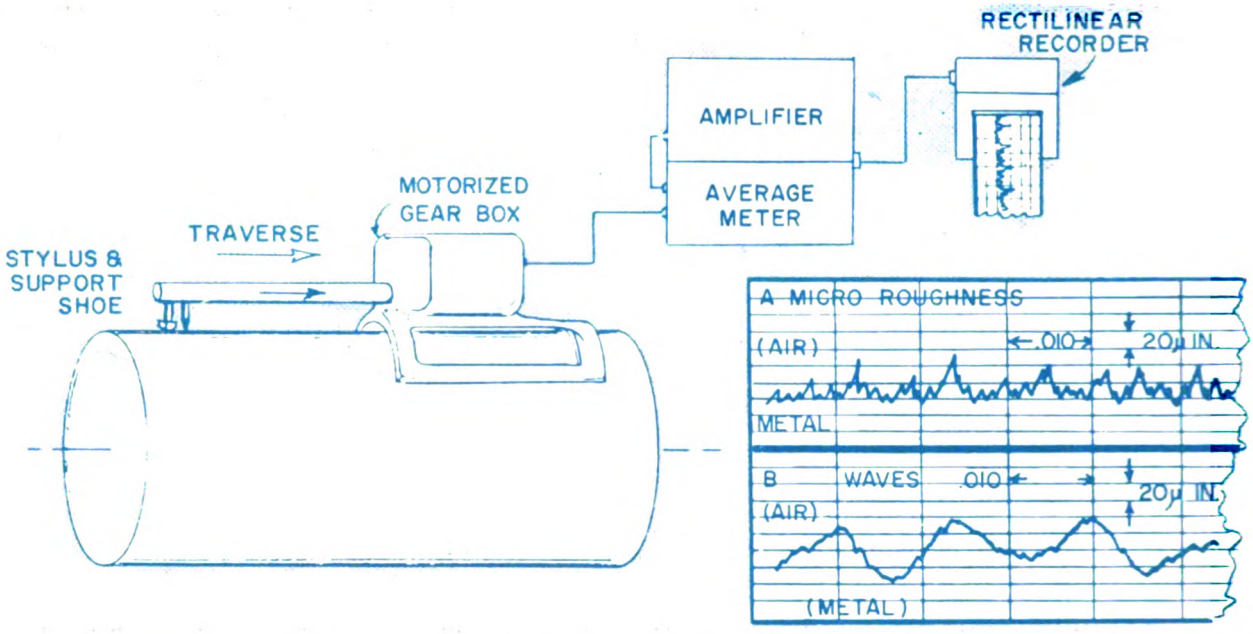


Fig. 1. Talysurf machine can measure journal surface profile in axial direction with stylus moved by motorized drive. Microroughness (A) is evide of asperities produced by removal of metal with machine tool; waves (B) are generated in axial direction by feed of the machine tool.

Better Support-Bearing Performance

Proper measurement and preparation of axle journa under traction motor support bearings is importa

By R. W. Avery
P. H. Baker
J. K. Wentz

Traction motor support bearings must operate under conditions of heavy loads at speeds from zero to over 700 rpm. These heavy loads tend to be concentrated on a relatively small area as the axle deflects under the weight of the locomotive and the gear reaction cocks the motor on the axle. Heavy starting loads are applied before an oil film is built up. Although this film builds up rapidly as axle speed increases, operation on thin oil films is a common condition because of load changes and high-speed impact. Therefore, a good axle finish is necessary so that the oil film will not be penetrated by microscopic roughness peaks (called asperities) on the axle journal surface.

It has long been known that after an axle journal becomes worn-in to a smooth surface the bearing usually gives excellent performance. Bearing failures are much more apt to occur during the break-in period of a new or refinished journal surface. Moreover, different manufacturing methods produce journals with different surface finishes which operate with different degrees of success. The performance of traction motor support bearings is of major interest to both the railroads and the locomotive builders. Engineers in General Electric's Locomotive and Car Equipment Department have investigated the problem with a view to improving this performance.

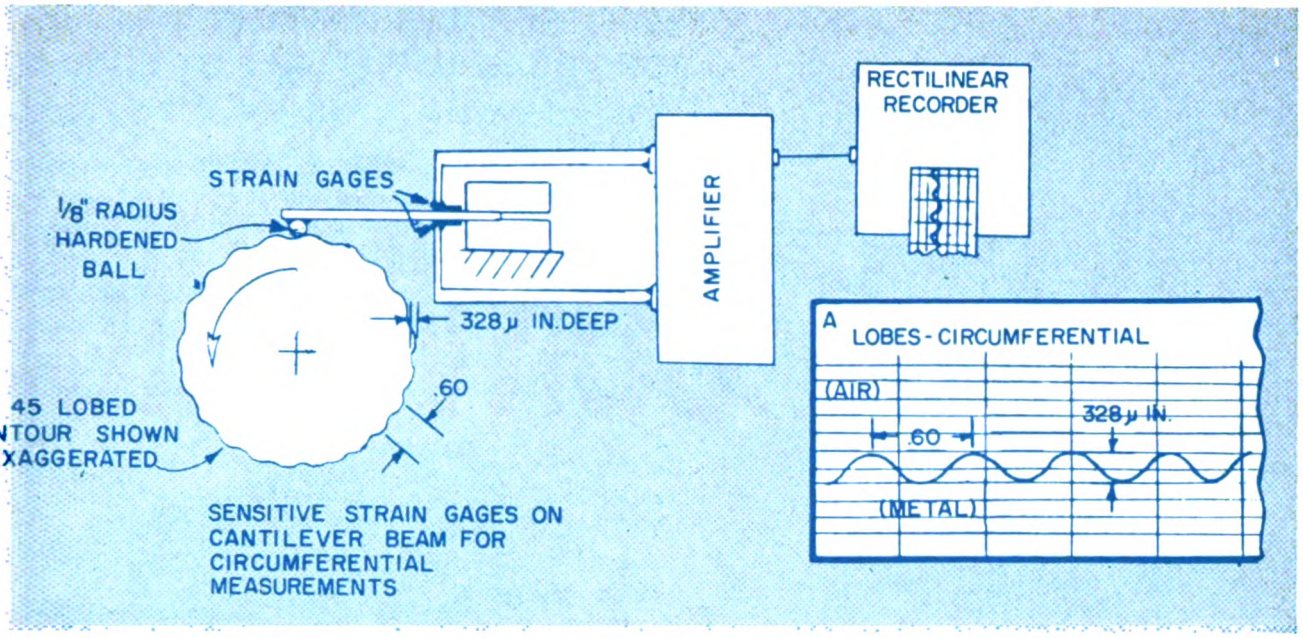
While many factors, such as bearing material, geometry, and lubrication were known to have significant influence on bearing performance, it quickly became apparent that journal surface finish was a major factor. Surface finish should be expected to be equally important in the operation of the thrust collar of the bearing. Therefore, a method of measuring surface finish had to be found which would give the information needed to predict the operation of the bearing and make possible analysis which could increase bearing life.

The measurement of surfaces h usually been made in terms of mic inch RMS (root mean square) ind numbers. Root mean square is a te used with profiling readings to ind cate the degree of surface finish. R is the square root of the average mean variations. All the readings added together and squared. T square is then divided by the numb of readings. The square root of t figure is the root mean square. varies somewhat from the arithmeti mean, or average, and in the res gives larger surface variations mo "weight" than the smaller variatio are given.

General Electric investigators fou that the performance of journals fi ished by different processes vari widely, even though they had the sa RMS index number. It became e dent that a better measurement me od should be used.

Plastic replica photomicrograp interference photomicrographs and t taper sectioning technique were a tried. However, the most useful to for this type of investigation was fou to be a surface measuring instrum

Authors are with Locomotive and Car Equipment Department, General Electric Co., Erie, Pa.



2. Measure of circumferential lobes is done with refinement of basic Talysurf surface measuring technique. The lobes result from chatter or vibra- of tool or grinding wheel used in finishing the journal. Such vibration occurs many times during a single revolution of the work.

ed the Talysurf, manufactured by British firm of Taylor & Hobson. as the advantages of being accu-, rapid in application and nonde- ctive to the specimen. The Taly- has a diamond-tipped stylus with dius of 100 microinches, which is ed across the surface of the sample a motorized drive. The surface ile is reproduced accurately on a er tape at magnifications from)0 to 50,000 in the vertical direc- and 100 in the horizontal direc- .

his machine will also measure the rage departure of all points of the e from the center line of the wave n. This is called the center line rage (CLA). The CLA index ıber usually gives numerical values to 30% less than the microinch S index values. The peak-to-valley ht of the actual surface is normal- hree to four times the microinch x number. However, individual rities may exceed this.

he 100-microinch radius of the surf stylus tip not only permits a accurate reproduction of the sur- profile, but also permits a more ırate determination of the rough- index number than the 500- roinch tip radius commonly sup- l on instruments for general shop This is especially true on the other surfaces where the coarser tends to span small microrough- .

Fig. 1 shows the use of the Talysurf machine to measure surface profile in an axial direction. Measurements in the circumferential direction are made by placing the instrument on an independent support and rotating the work piece beneath the stylus support and shoe.

Circumferential Profile

Larger variations in circumferential contours were measured by the method shown in Fig. 2. An accurate indication of circumferential lobes was obtained by using a cantilever beam with a ⅛-in. diameter steel ball as a tip stylus. The ball rides on the surface of the slowly rotating journal, and the output from the strain gages is amplified and fed into a recorder.

Two types of surface roughness charts, both taken along the axis of the journal, are of major interest. These are the microroughness and wave charts, shown in Fig. 1. The microroughness is an evidence of the types of asperities produced by removal of metal with the machine tool. Various surfaces result, depending upon the method used to finish the journal surface on the axle. Since the vertical magnification in these Taly-

(Continued on page 32)

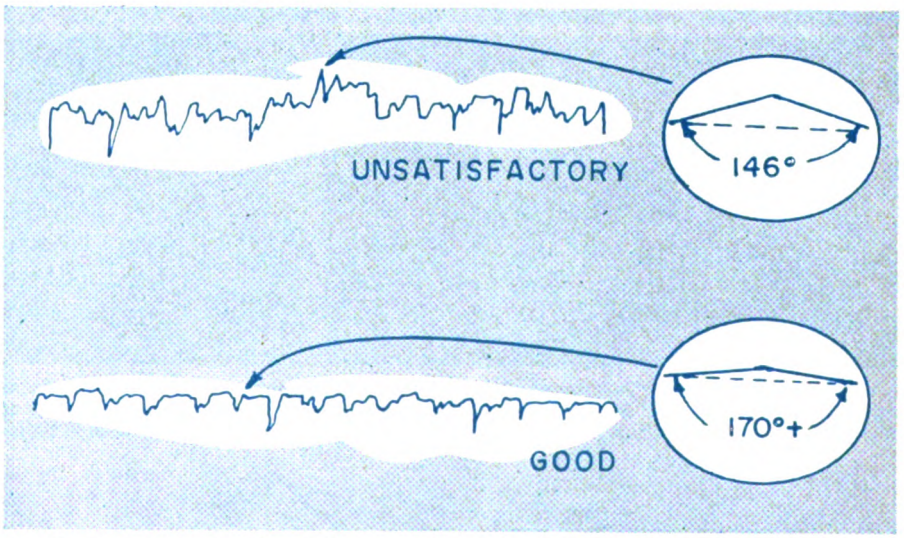
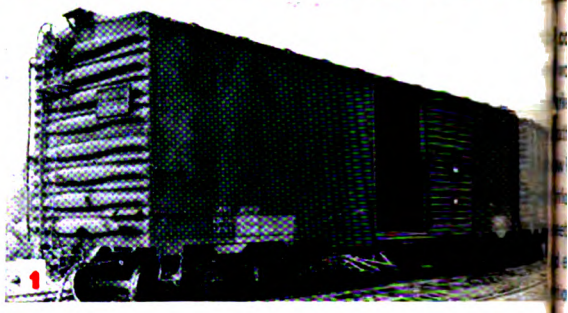


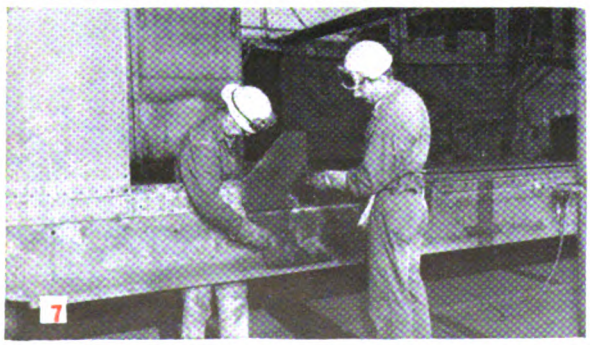
Fig. 3. Vertical magnification of Talysurf charts is 50 times the horizontal. The asperities are actually much broader in true shape than are indicated on the recorder chart.

CONVERSION













1. Veteran 40'-6" box car with 6' door before conversion. **2.** Burning side plate in half—removal of side sill. **3.** Preparing old center sill to mate with 10' extension. **4.** Center sill extension assembly including new crossbearers and floor beams being positioned welding. **5.** New side sill reinforcement for 50'-6" car being stalled. **6.** Side plate with reinforcement for 15' staggered

PULLMAN-STANDAR

A DIVISION OF PULLMAN INCORPORATED / 200 S. MICHIGAN AVENUE • CHICAGO 4, ILL

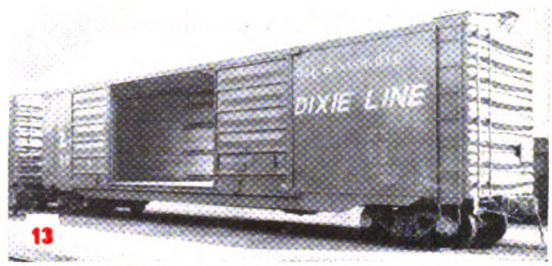
: DIXIE LINE IS CONVERTING VETERAN BOX CARS TO LIKE-NEW 50′ CARS, WITH : HELP OF P-S PARTS AND SERVICE.

L&N STYLE

ıg famous for its rolling stock, the L&N is continuing to stay in front ipper needs by converting veteran box cars to larger capacity, r cube units. The L&N conversion program calls for bringing in fteen-year old 40′-6″ cars with 6′ sliding doors, and extending \o 50′-6″, while performing many important upgrading and re- ng operations. By lengthening these box cars ten feet, and in- g staggered 15′ double doors on the first 100 cars and on-center uble doors on the second 100, the L&N is able to convert tech- obsolete cars into modern freight equipment.

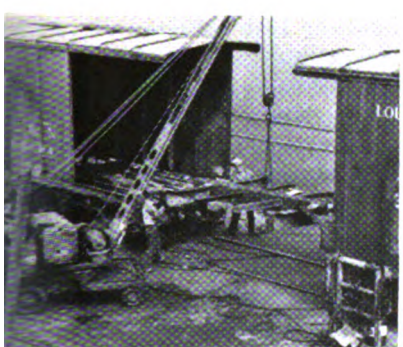
NVERSION: L&N STYLE begins when old 40′ cars are first stripped od floors and interior linings. Damaged or worn parts are ear- d for repair or replacement. Then, step-by-step, at the L&N's Louisville Shop, the cars are burned in half and extended to 50′. 'ullman-Standard parts such as the center sill extension, side sill rcements, roof side plates, door posts, side sill gussets, side , underframe stringers, etc. make this conversion process fast conomical. Finally, new flooring, side and end lining, lading re- ı accessories and P-S double doors are installed. With a fresh f paint, like-new 50′ box cars are ready for service, well below ar cost.

lman-Standard can assist many railroads, like the L&N, in freight uilding, upgrading or conversion. In addition, we are staffed and ıed to handle every phase of such activity on a mass production n our own freight car plants. For information on P-S Parts and e, write or call our nearest sales office.



13


12





5


6




11

pplied. **7.** Combination door post and side sill gusset ap- . **8.** Welders fitting new posts for P-S 15′ doors. **9.** New ets going into place. **10.** Each car receives new bolster top cover plates. **11.** New P-S roof sheets and seam caps mate with existing roof. **12.** View of refurbished car interior. **13.** Like-new 50′-6″ Dixie Line box car after conversion.

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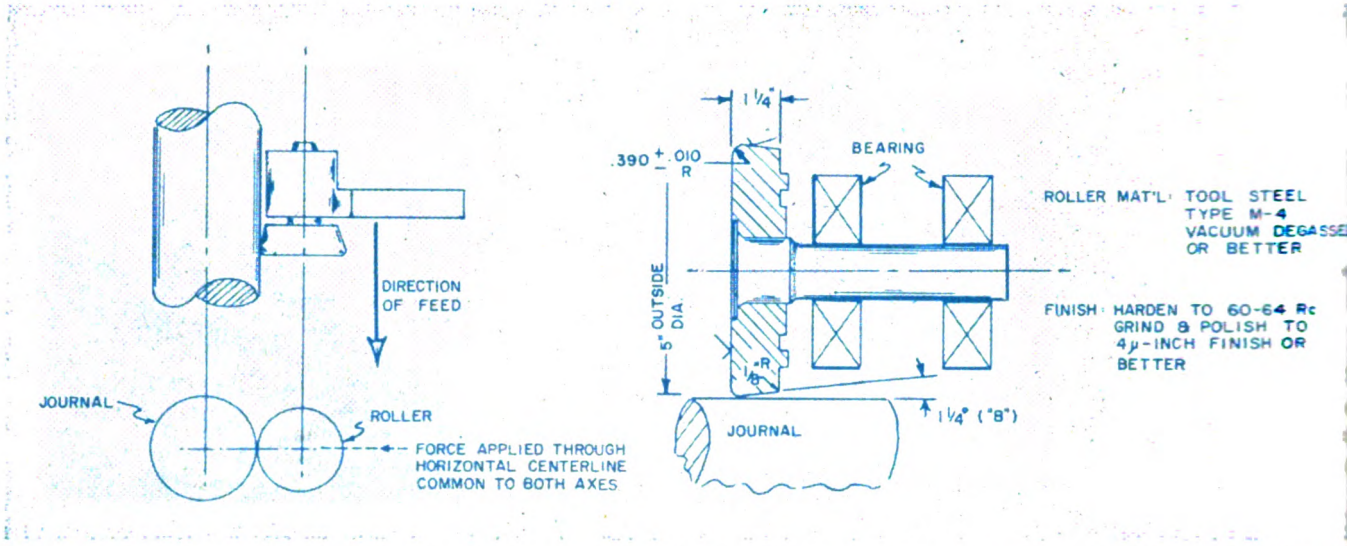


Fig. 4. Design, mounting and finish of roller assembly is important in producing satisfactory support bearing journals. Any defects in the roller will be imparted to the journal surface. Minute visual inspection of new and reground rollers should be made, detecting even the most minute pits or scratches on the rolling surface. Rotational axis of roller should be in the same horizontal plane as the center line of the journal and parallel to it, producing a 1¼-deg clearance angle between journal and roller. Roller must turn free but must not wobble.

(Continued from page 29)

surf charts is 50 times as great as the horizontal, the asperities are actually much broader than indicated in the recorder.

Waves in the surface in the axial direction are caused by feed of the machine tool. The lobes in the circumferential direction result from chatter or vibration of the tool or grinding wheel occurring many times per revolution of the axle. Reliable predictions of bearing performance can be made by analyzing the Talysurf charts.

A good journal has the desirable features of axial straightness, very few asperities, and well flattened peaks. Depressions are not objectionable if they are spaced widely enough so that the vital bearing contact area is not lost. Even when there are deep scratches or cuts, produced by hand sanding before rolling, the journal can still perform satisfactorily. If widely spaced, these scratches do cause some loss of bearing area. This loss will not be serious, however, if the bearing contact surface is straight in the axial direction, if there are few asperities, and if the peaks are nearly flat.

Characteristics of an unsatisfactory journal include a surface ragged along the axis of the journal with relatively sharps peaks and asperities, and with this surface not straight in the axial direction. Such a finish is typical of that produced by belt-sanding or by an inadequate rolling method. Another unsatisfactory surface, produced by an inadequate method of rolling, can have: a small microroughness even though there are numerous waves and a lack of straightness in the axial direction. After journals that have been in service for a long period, they show a high degree of axial straightness with few asperities, and may show some pits or scratches which do not cause significant loss of bearing area.

In the limited tests conducted, no evidence was found to indicate that circumferential lobes caused poor performance. For instance, journals with lobes such as shown in Fig. 2 operated in a highly satisfactory manner in both laboratory and service tests.

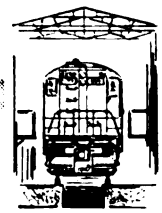
Successful Method

While there are various successful methods for finishing axle journals, the following rolling process has given good results.

- Grind the surface to size for rolling, with a finish of 60 microinches maximum. Rolling reduces the diameter only about 0.00025 in.
- In using a roller assembly the quality of the roller is an important factor in getting a desirable surface finish. Any defects in the roller will be imparted to the journal surface. A minute visual examination should be given to new or reground rollers to detect any pits, or scratches. The roller has limited life and should be replaced when pitted or worn.
- The rotational axis of the roller should be in the same horizontal plane as the center line of the journal, and parallel to it, producing a 1¼ degree clearance angle between the jour and the roller. The roller must t freely but must not be allowed to w ble.
- Thoroughly clean the axle w a good solvent before rolling.
- Apply a light machine oil (v cosity 100-110 SSU at 100 deg F) the area to be rolled. A continuo supply is not required. Other lub cants, such as kerosene, high visco oil, or high lubricity oils contain extreme-pressure or high film-stren additives, may produce a good looki finish, but it will not pass the Talys test. Experience indicates that such finish will not operate satisfactorily heavy-duty service.
- Rotate the axle at a surfa speed of about 100 ft per min.
- Hold the roller against the r tating axle with a pressure of 5.0 lb (plus or minus 300 lb) continuo ly measured and controlled during t rolling process.
- Feed the roller along the a at a rate between 0.010 and 0.025 per axle revolution. Make one p along the journal surface, always fe ing in the same direction, with the in. face of the roller leading.
- Rolling should be the LAST o eration on the journal surface. Do n apply sandpaper or other abrasive the surface after rolling. Protect t rolled surface from rust and mecha ical damage.

For good control of the rolling pro ess, check the quality of the finish taking Talysurf roughness traces fr time to time.

What Is Your Problem?



Prepared in cooperation with the Locomotive Maintenance Officers Association, these are offered as practical—but not the only—solutions to current locomotive problems. Along with problems and solutions submitted by LMOA members, those sent to the Editor by other readers are welcomed and published.

:action-Motor Rebuilding Procedures

/ should rebuilding of traction ors be handled—by rebuilding ompany shop, or by returning uilder?

solution to this problem involves < volume, consolidation of over- l, methods and procedures, and control. Failure to evaluate each ıese factors properly can result in ancial loss for a railroad. In some s this can result from operating pany shops; in others by utilizing -exchange services.

ailroads should consider operating pany repair shops when their aver- traction-unit repair and rebuild approaches $1,000,000 per year, ı work load of five traction-units day.

. work load of five traction-units day can be expected on railroads ating 500 diesel units. In this y a traction-unit is defined as fol- s:

action motor . . . . 1 traction unit
ain generator . . . 2 traction units
uxiliary or exciter generators, action-motor blowers, or ngine-cooling-fan motors
1 traction unit
Fuel pump motors, tacho- ıeter generators, or blowers
1 traction unit

he average repair cost per traction should be approximately $1,000. h a work load of five such traction s per day, the annual repair cost ıld be $1,300,000. With proper trol, a company-operated repair o processing this volume should w a substantial savings over unit ıange service.

rhead Control

ontrol of overhead is essential in r for railroads to economically re- d traction units. The ability to con- date all major repairs at one cen- location will be a determining or in controlling overhead. It is sible on many railroads to add a traction-unit repair shop to their present heavy diesel repair facilities, which can result in a decrease in their present overhead cost.

Supervisors for traction-unit repairs must be carefully selected and trained to insure the effective and efficient use of labor, material and equipment. A careful study must be made to determine the proper method for processing traction-units. Control of flow, cleaning and testing procedure, upgrading, and quality control must be established. For economical rebuilding, none of these factors must be overlooked or left to chance.

Control of labor productivity is a prime factor in determining if traction unit rebuilding in company shops will be economical. Production schedules and labor-time requirements must be set. Production equipment must be built or purchased to insure a quality product involving a minimum of labor. The purchase of expensive equipment not warranted by production requirements must be avoided. Use and acquisition of material must be controlled and reclamation of parts must be studied closely. Adequate records should be kept to determine both the labor and material costs with procedures established to hold both in line. Performance records of repaired units should be correlated with rebuilding costs.

Railroads not in the position to control labor time, material cost or quality should use unit-exchange. Sufficient work volume along with control of labor time, material costs, and quality can economically justify railroad-operated repair shops for locomotive traction equipment.

C. J. Frey, electrical department foreman, Rock Island.

Carry-Over in Brake System

How can fouling of air brake equipment, resulting from oil and tar carrying over from locomotive air compressors, be avoided?

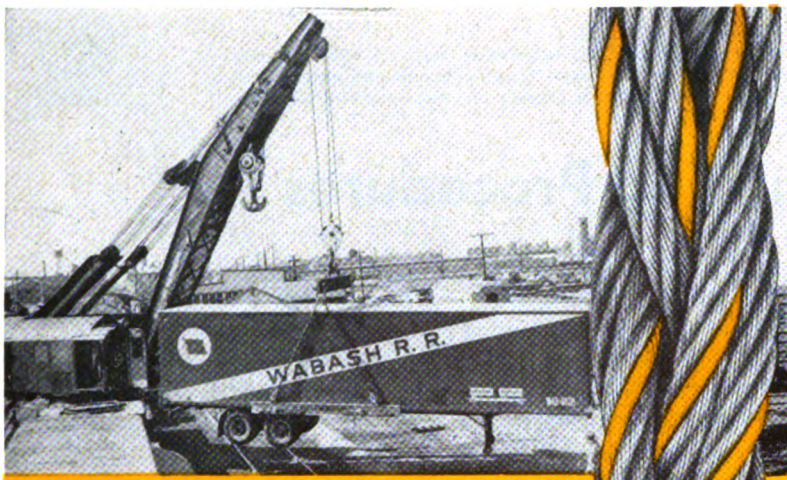
We honestly believe that there is a good solution to this problem. For a number of years we have done development work on the air compressor, which resulted in the adoption of a number of features, such as:

- Water-cooled cylinder liners and cylinder heads;
- Water-cooled intercooler;
- Greatly improved oil control, possible with the use of the water-cooled liner;
- An improved oil level gauge which permits checking of the oil level with the engine in operation;
- A new oil filling arrangement which prevents over-filling of oil;
- New breather arrangement;
- New wrist pin bushings.

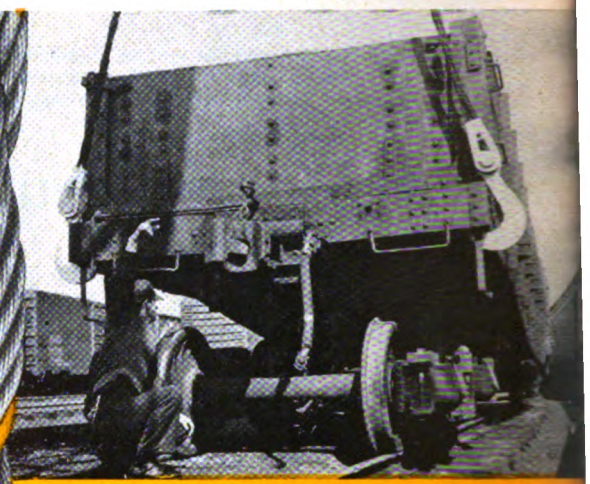
These items have been in production for some time. There have been no lacquer or tar formations observed in the air brake system when this latest water-cooled compressor is used. Carbon buildup on the valves has been eliminated. Furthermore, a compressor of this latest design, in proper working condition, will eliminate any oil problems in the air brake system. We have witnessed a number of test air compressors which have operated very successfully for one year without the addition of make-up oil to the crankcase.

Oil and tar carryover cannot be easily eliminated in any separator that we have tested. This problem, however, can be very effectively controlled at its source—the air compressor. This is possible by reducing cylinder temperatures with water cooling and by using the prescribed oil control rings.

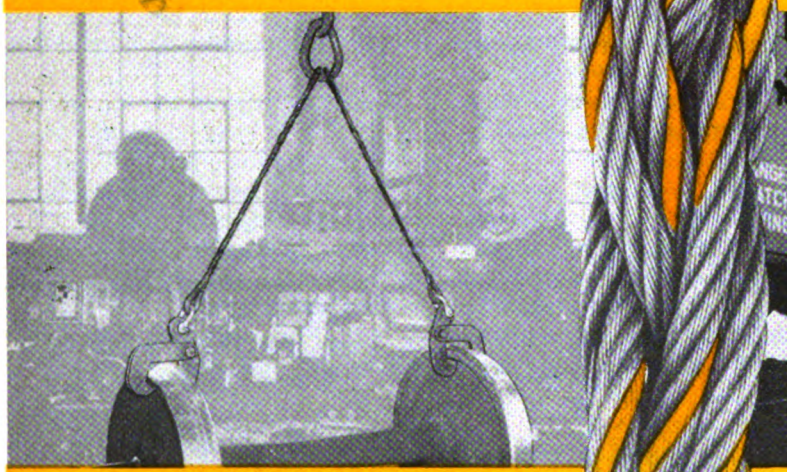
Max Ephraim, Jr., assistant chief engineer, Electro-Motive Division, General Motors Corp.



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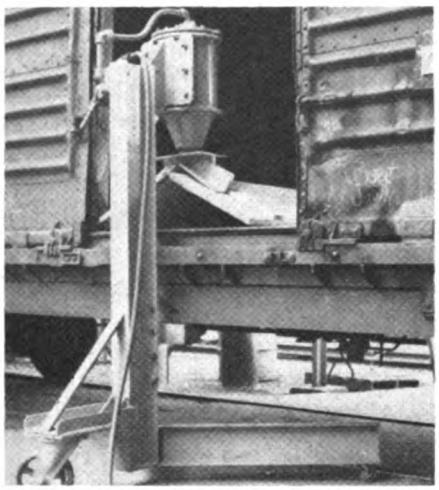
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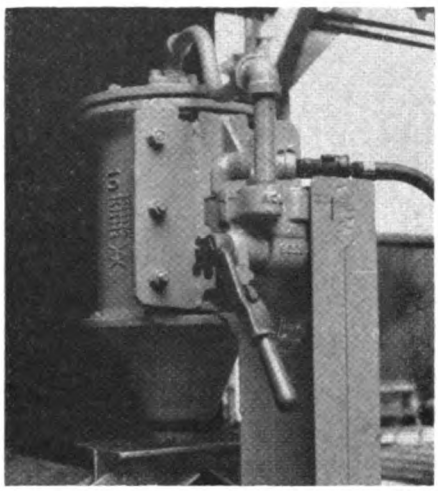
;ar Repair Time Savers

\CL Jig Compresses Box-Car Flooring

ıor compressing jigs are simplifying the tallation of prefabricated wood flooring ıels in box cars undergoing repair at the antic Coast Line shop in Waycross, Ga. e device, powered by a 10-in. air-brake inder, has been designed for use at the doorway. Two of the devices are used, at each side of the car. The floor panels installed from the ends of the car, and final two are forced into position with two jigs. Each one has a frame made 7-in. channels carried on three rubber-ad casters. On the vertical member, com-sed of a pair of channels, are mounted brake cylinder and a variable-height which is hooked under the car's side during the pressing operation. A three-sition brake valve controls the admission d exhaust of the compressed air in the ake cylinder. Use of the device speeds the oring application and assures a snug fit the panels. The device is used at one tion on repair line.



Vee-shaped die on the piston rod is brought down on the last two floor panels to be installed, pushing them down into position.



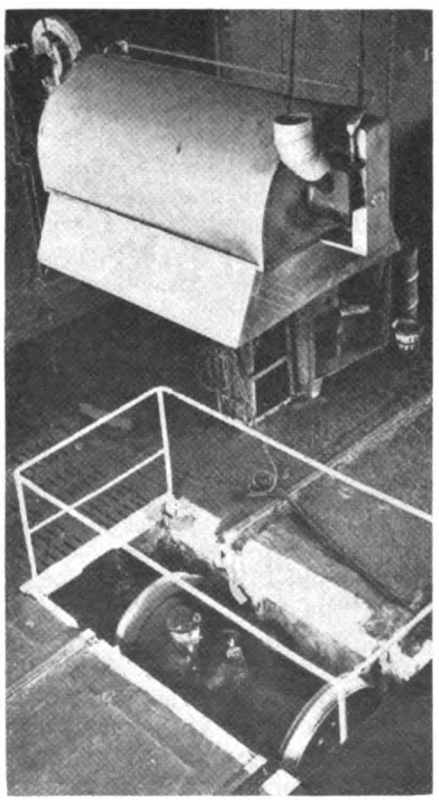
Brake cylinder is mounted on top of vertical member. Three-position valve controls the admission and exhaust of compressed air.

;anta Fe Heats Coach Shop Drop Pit

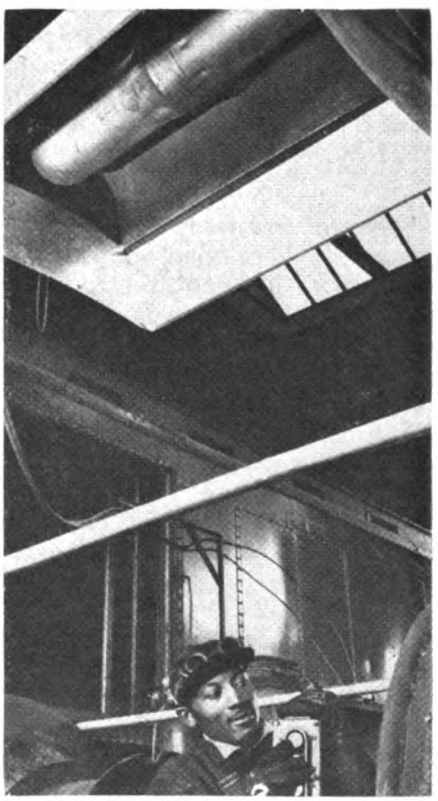
ıe Santa Fe has solved the problem of eping its wheel-changing facilities at the st Street Coach Yards in Chicago free of and snow. A Vapor Infradiant heater ıs suspended directly above the drop pit radiate heat down into the pit. The area roofed over, but the building is open at th ends. In winter, snow and rain blown to the building and pit froze the wheel ck and traversing mechanism, and it was equently necessary to chip the ice away fore the equipment could be used.

Soon after the unit was put in operation, and snow in the bottom of the pit dis-peared as well as snow on the floor level the immediate vicinity. For the first time, e bottom of the pit was dry and working nditions much improved.

The heating element in the heater con-sts of a temperature-resistant stainless-eel tube 60 in. long and 11 in. in diameter. t one end of the tube, a gun type burner ing diesel fuel or No. 2 oil is mounted. fan supplies a portion of the combustion r at the burner end. Secondary air passes rough a duct where it enters the com-ıstion tube using a counterflow principle. he products of combustion are vented to mosphere. A parabolic stainless-steel re-ector concentrates and directs the rays onto ıe area to be warmed. According to V. L. Harlo, the mechanical superintendent at hicago, "the Infradiant heater has not only vercome a very difficult heating job, but as provided a substantial saving in man-ours."

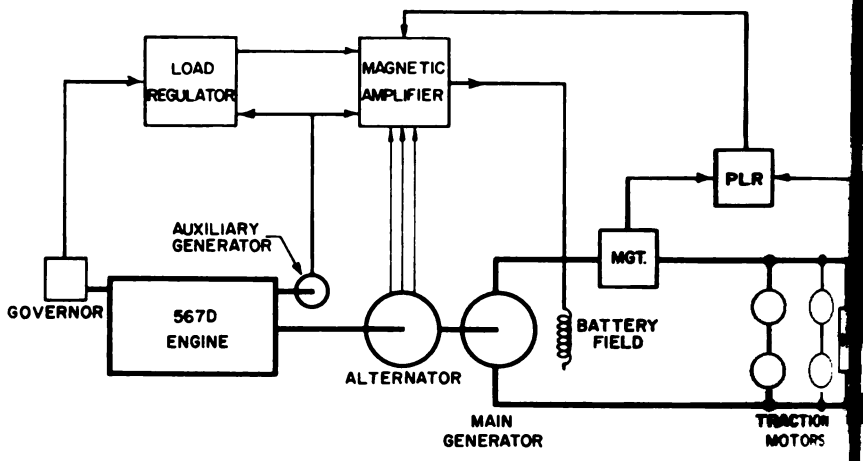


Heat directed down into single-wheel-set drop pit in coach repair shop has solved freezing problems encountered in cold weather.



Conditions for carmen have been greatly improved with installation of stainless-steel reflectors concentrating heat in working area.

Static Controls for Dynamic Diesels



By Gordon Taylor

Last month Doc Watts, newly returned from the manufacturer's instruction sessions, began to explain the controls of the GP-30's which his road would soon place in service. Static controls—indentified as the "control of tomorrow" by Doc—were described as involving primarily magnetic amplifiers and semiconductors. Static excitation of the D-22 main generator involves a magnetic amplifier which regulates current for the separately excited field —still known as the "Battery Field" even though it is now the rectified output of the locomotive's alternator. First Doc described the main generator current transductors, MGT-A and MGT-B.

"We are now ready to discuss the generator voltage transductors, GVT-A and GVT-B. They are used in the magnetic amplifier circuit to supply a feedback signal proportional to main generator voltage. They are saturable core reactors with d-c control coils. These control coils are connected in series with a fixed resistor across the main generator lead. This makes the current strength in the d-c coil of the reactor proportional to the main generator's output voltage.

"The a-c coils of these transductors receive their current from the alternator. The current strength in the a-c coils again depends on the current in the d-c control coils, which is a function of the voltage across the main generator. The signal current from the a-c coil is fed to the primary winding of control transformer T-1. The current in the secondary of transformer T-1 will be proportional to the voltage across the main generator. The signal current from the secondary of T-1 is rectified and fed into the circuit so its value is added to the feedback signal set up by transductors MGT-A and MGT-B.

"The sum of the main generator feedback current and voltage signals is compared with the closely regulated 74-volt output of the auxiliary generator. The load regulator rheostat is connected across the 74-volt auxiliary generator circuit, controlling the power output of the system according to instructions received from the feedback signals."

At this point, Doc spread out the schematic wiring print and said: "I would like to point out another very important member of the GP-30 control team. It is known as the Power Limit Relay indicated on the print as 'PLR.' It is a polarized relay which means that a change of direction of current flow through its operating coil reverses the action of the relay. PLR operates when an unbalanced condition develops between the 74-volt signal from the load regulator arm and the feedback signal across the PLR coil. Terminals of the PLR coil are numbered 1 and 3. Equal voltage at 1 and 3 results in zero current in the coil, leaving relay contacts 8 through 2 standing open. This affects the control circuit so there is a major reduction in amplifier drive current, resulting in a reduction of battery field excitation, which causes a reduction in generator output. A flow of current from 1 to 3 in the PLR coil acts the same as zero current; it causes contacts 8 thro 2 to open.

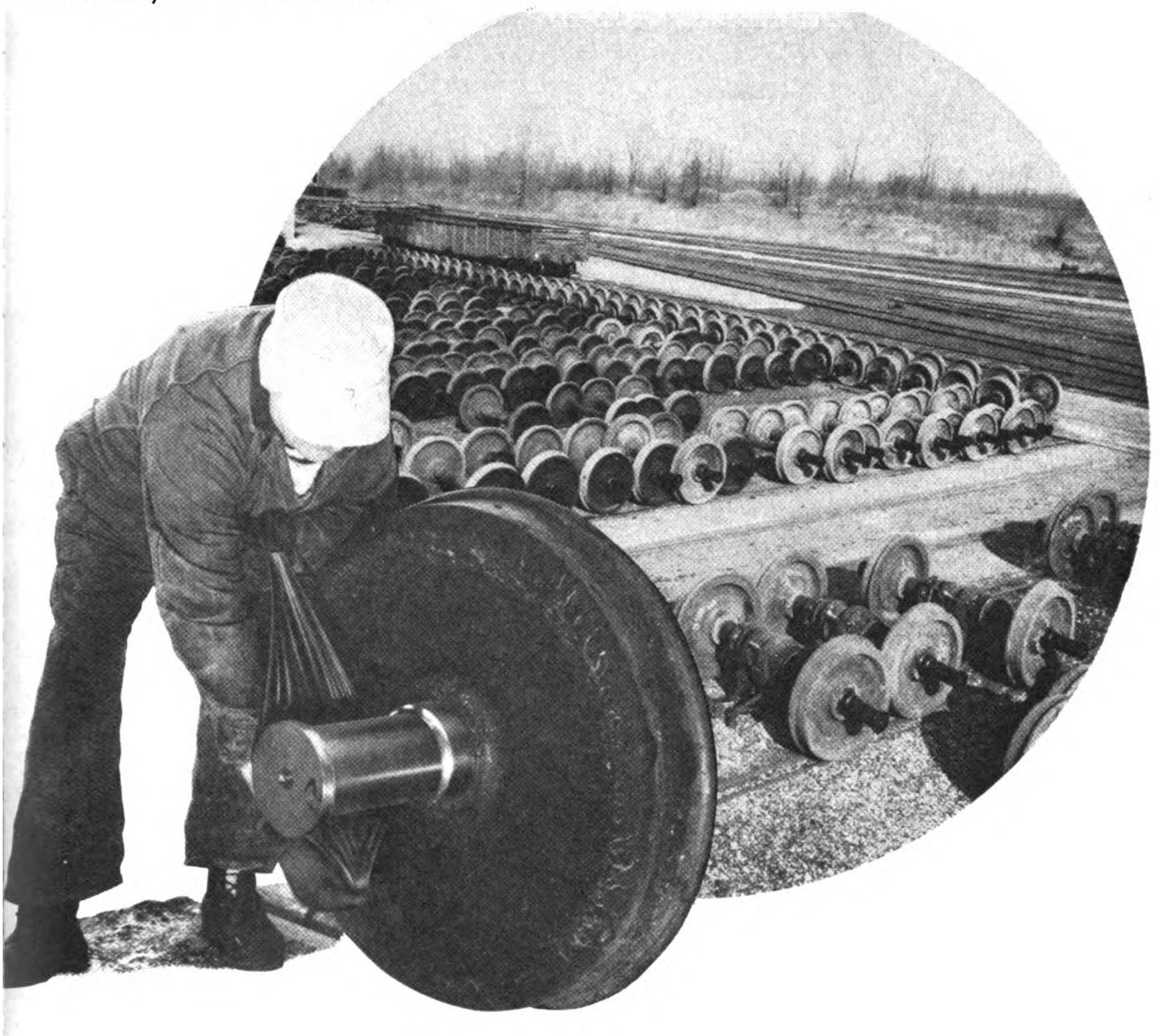
"Now suppose the feedback s from the main generator is less 74 volts. This puts a lower volta PLR1 than at PLR3, resulting in rent flow from 3 to 1 which c contacts 8 through 2 to close and ses current through the control of FM1, FM2, and FM3 (battery excitation reactors) which incr battery-field current to give full tery-field excitation. It follows that the governor can control the on the engine by moving the regulator to a position which re a feedback signal corresponding desired load. The control syst acts so rapidly that fluctuation power output are insignificant. result, we find that the powe relay and the load regulator o GP-30 are always as well balanc a tight-wire walker. They cons respond to signals from the main erator in a manner that insures best possible use of power that is available from the power plant

"As we examine the wiring we notice several rheostats that to be associated with the load lator. They appear to be of th justable type, similar to the load lator rheostat. We know that the regulator rheostat is operated hydraulic vane motor. This r question about what operates the stats RH1 through RH7. Inqu the factory developed that the vide semipermanent trimmin balance adjustments in the c circuits, and are set at the f These rheostats are:

- RH1 and RH2 which are

(Continued on page 39)

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.



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r all-weather plastic coating ɔs off clean in seconds—This ɔr road has the records to prove it. y coat journals on 36,000 pair of els a year. Figuring all material s and labor, they save an average)¢ a pair.

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PLASTA-GARD can be applied at any temperature. Formulations are available for brush or spray application.

Investigate the important economy and convenience of PLASTA-GARD strip-coating for your road. Send for a sample and cut your wheel protection and maintenance costs.

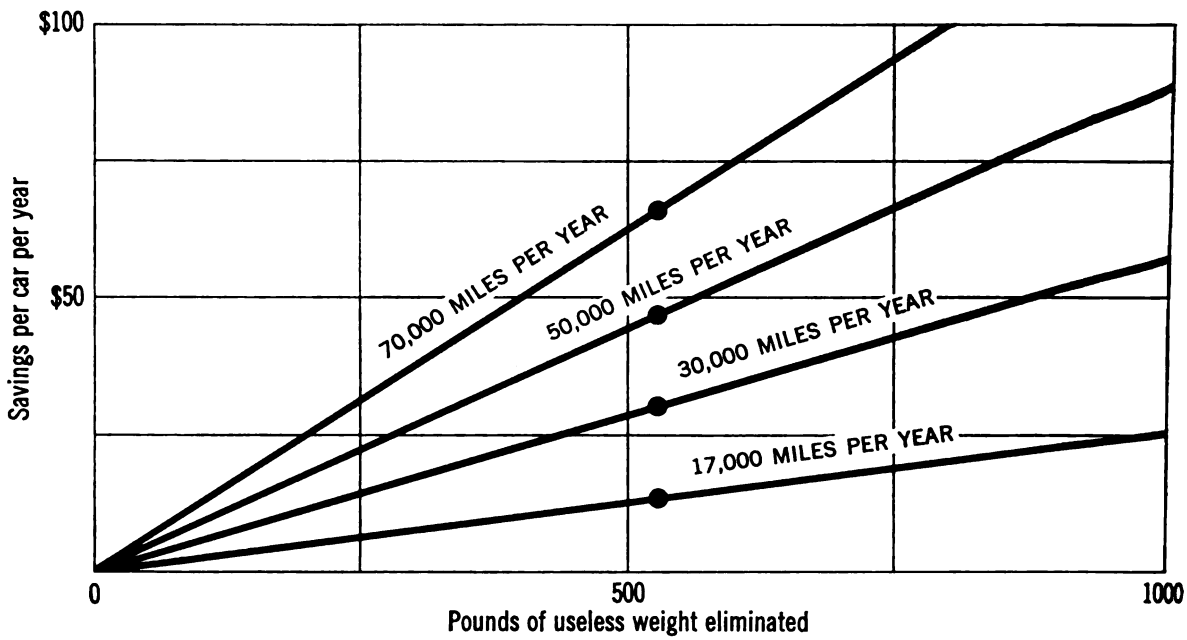
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WHY YOU SHOULD BUY WROUGHT STEEL WHEELS

Graph shows quickly your savings in OUT-OF-POCKET costs



Your out-of-pocket costs of hauling *useless* dead weight can add up to thousands of wasted dollars in a year's time.

But wrought steel wheels are lighter by 560 pounds per carset (average for 50-ton freight car) than wheels made by another method.

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You can *save* thousands simply by using lighter-weight wrought steel wheels. You eliminate unnecessary dead weight. You can put this 560 pounds into payload or other useful specialties.

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Data from I.C.C. "Railroad Carload Cost Scales."—Statement 3-61, Dec. 1961, Box Cars.

A SYMBOL OF WROUGHT STEEL *SERVICE-PROVED QUALITY*

EDGEWATER STEEL COMPANY

P. O. Box 478 • Pittsburgh 30, Pa.

(Continued from page 36)

t the bias coils of the magnetic ifier to establish minimum and mum bettery field current values; H3 which adjusts the bias coil of magnetic amplifier to establish mum traction-motor field current s for dynamic braking;

H4, RH5, RH6, and RH7 which n the power limit network circuit are used to determine the power settings for the locomotive.

Small precision rheostats can be in the control circuit of the mag--amplifier-equipped GP-30's be- e the currents are very low in con- to the control circuits of the older motives where high wattage re- rs were required.

Another advantage of the feed- power control is that it makes ible operation of the GP-30 with r, less powerful locomotives in any bination and without danger of loads. Adhesion for low-speed, vy drag service on heavy grades so improved. It is the control that s us maximum use of horsepower ilable.

In addition to the static devices d for power-plant control, the -30 also has two transductors— T14 and WST23—used for wheel- control. These operate the same hose on the GP-20 units (RL&C, e 1962, p 49).

As you examine the wiring dia- m you will see many rectifiers sta- ed to direct the flow of electric rent to the proper circuit paths. ey not only serve to rectify alter- ing current, but, as blocking relays, y see that the recified current stays the right paths. In the battery- rging circuit, rectifiers are used in d-c circuit, not for rectifying but ply as a check valve to permit cur- t from the auxiliary generator to w to the battery whenever the gen- tor voltage exceeds the battery tage (RL&C, July 1962, p 45). this way the need for a reverse rent relay is eliminated, reducing intenance requirements.

"We haven't touched on the transi- n control of the new units," Doc ncluded. "It is much improved over old style transition, but we'll have make it the subject for a future dis- ssion. To wrap this up, I'll summa- e by saying that static controls are controls of tomorrow. We must rt learning today, it seems certain ey are here to stay."

AAF AMER-kleen air filters do a better job at lower cost on engine intakes and carbodies



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2. *LOWER FILTER OPERATING COST.* It's far less expensive to replace AMER-kleen glass fiber media at regular intervals than to wash and re-oil metal filters.
3. *LOWER LOCOMOTIVE MAINTENANCE COSTS.* AMER-kleen allows far less dirt (about half that of metal filters) to get to — and into — your equipment.

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Products Reference 40A

Cut Lading Damage

(Continued from page 25)

thetical example, take a cushion underframe costing $3,000. It is a simple accounting matter to develop that an annual carrying cost of $300 is needed to provide for the capital involved. This increased cost would require a saving in excess of $300 annually to reach the break-even point.

To make a worthwhile study of this problem, it is necessary to agree on certain objectives and assumptions. Devices available for varying degrees of protection might be classified:

- Gear travel of 2¾ to 3½ in., the present standard;
- Gear travel of 4¾ in. developed in the 36-in. pocket gear;
- Cushion underframe with medium travel—5 to 10 in.;
- Cushion underframe with long travel—10 to 30 in.

There is some overlapping. There is also considerable discussion now as to how to control travel. Hydraulic, rubber-cushion, and mechanical-friction systems are being used for absorbing energy; some are combinations.

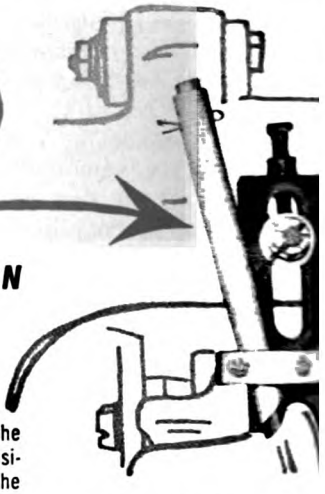
The next step is to show what commodities require the protection afforded under the four different categories. Liquids, mine products, bulk flour and commodities of these types do not require anything more than the protection of conventional draft gears.

Cushion underframes must be evaluated to determine which types are needed for different services. The AAR Research Center is now working on this evaluation. The laboratory also has facilities for evaluating draft gears, and certifies all draft gears for interchange service when they fulfill AAR specifications.

Progress has been made in improving the standard pocket gears. A few years ago the minimum foot-pound energy requirement for a 24⅝ pocket gear was 18,000 ft-lb. Some gears were uncomfortably close to the minimum. The new designs of 36-in. pocket gears must have a minimum of 75,000 ft-lb with a travel of 4¾.

Considering that draft gears and cushion underframes give protection only in a longitudinal direction, one might be asked why so much protection is necessary. Car coupling speed is the principal factor. If this were about 1 mph, there would not be much

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problem. The Freight Loss and nage Prevention Section of the R, with the cooperation of AAR nber roads, tries to educate yard es to control coupling speeds so 4 mph will be the maximum. It ot known how much higher coup- speeds would be without this pro- n, but it is true that they are fre- ntly greater than desired with it.

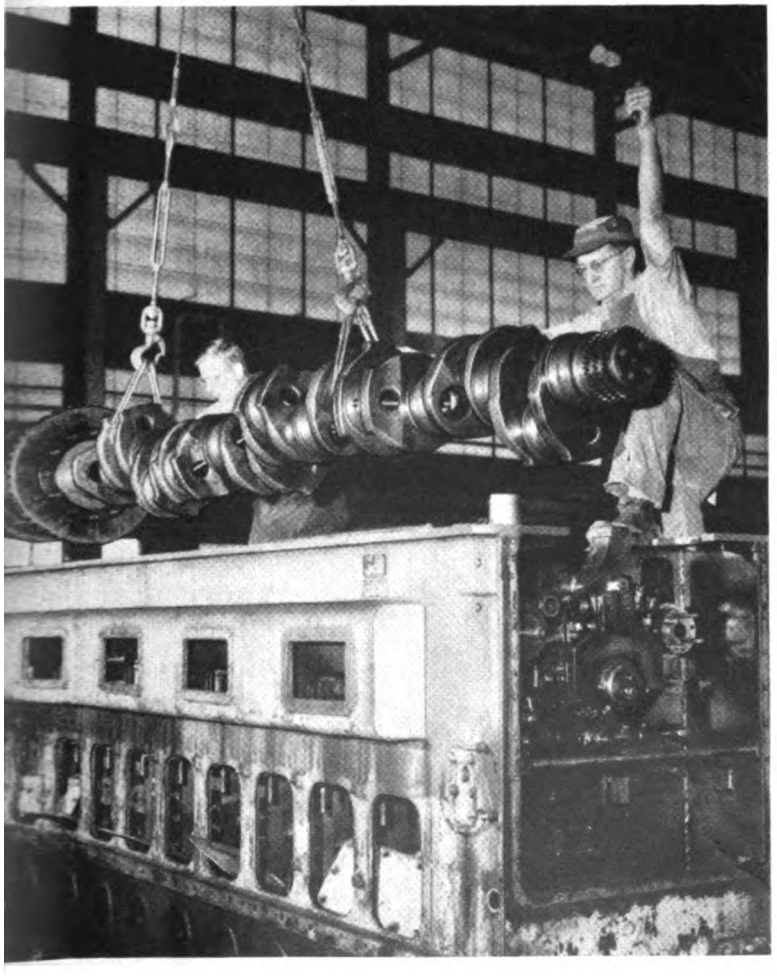
nalysis of conditions conducive to ssive impacts in classification ls discloses that variation in rolling tance of cars is an outstanding or. A very small percentage of have high resistance and are com- ly referred to as slow or sluggish rs. If a slow roller is sent over a sification yard hump at the correct d for cars of average resistance, it probably stop short of the train require a trimming locomotive. is inefficient and slows yard oper- n. It encourages the speeding of all going over the hump. If there any way to quickly distinguish slow rollers from the free-rolling the slow rollers could be sent n the hump at greater speed. e is no way that these cars can lentified except by demonstrating their sluggishness in actual movement. Eliminating slow-rolling cars is under study at the AAR Research Center.

One cause of varying car resistance is wind. Wind resistance varies from day to day but affects all cars in the same proportion. Suitable speed corrections can be made on humps to compensate for it. Another cause is the condition of track. "Soft" track could result in variations, especially between loaded and empty cars. A reasonable adjustment is already made between empty and loaded cars going down the hump, usually sufficient to overcome track conditions. Another variable is truck condition. When the swiveling of the truck is restrained by excessive friction at the center plate, wheel-flange pressure builds up to increase the rolling resistance. The AAR has been studying means for lowering this center-plate friction to reduce the variations (RL&C, June 1962, p 27). The brake-rod arrangement is also under study to determine if it has any effect on variables in rolling resistance. ("Uneven Braking Affects Wheel Wear," RL&C Dec. 1961, p 34). This entire project has the name of "Freight-Car Rollability."

Packaging and bracing loads in cars is very important. Packaging engineers design cartons and crates not only for protection of lading in transit, but also for protection during handling to and from railroad cars, in warehouses, and from the retailer to the final consumer. Probably many shippers would continue to use protective cartons of the same general type now in use even if there were no need for protection in railroad cars.

Lading tie downs, strapping to prevent shifting of lading, and the blocking and bracing of shipments—subjects handled by the AAR Mechanical Division and the Freight Loss and Damage Prevention Section—are under constant review. Where cars are handled within normal speeds, a remarkable record for the prevention of lading shift has resulted.

It is necessary to prevent damage while reducing packaging and dunnage to the minimum. Additional data is needed to insure that correct steps are being taken. In providing protection for fragile lading, it is important that unnecessary expenses are not incurred in "over-protecting" lading that is not damaged by the average shocks.



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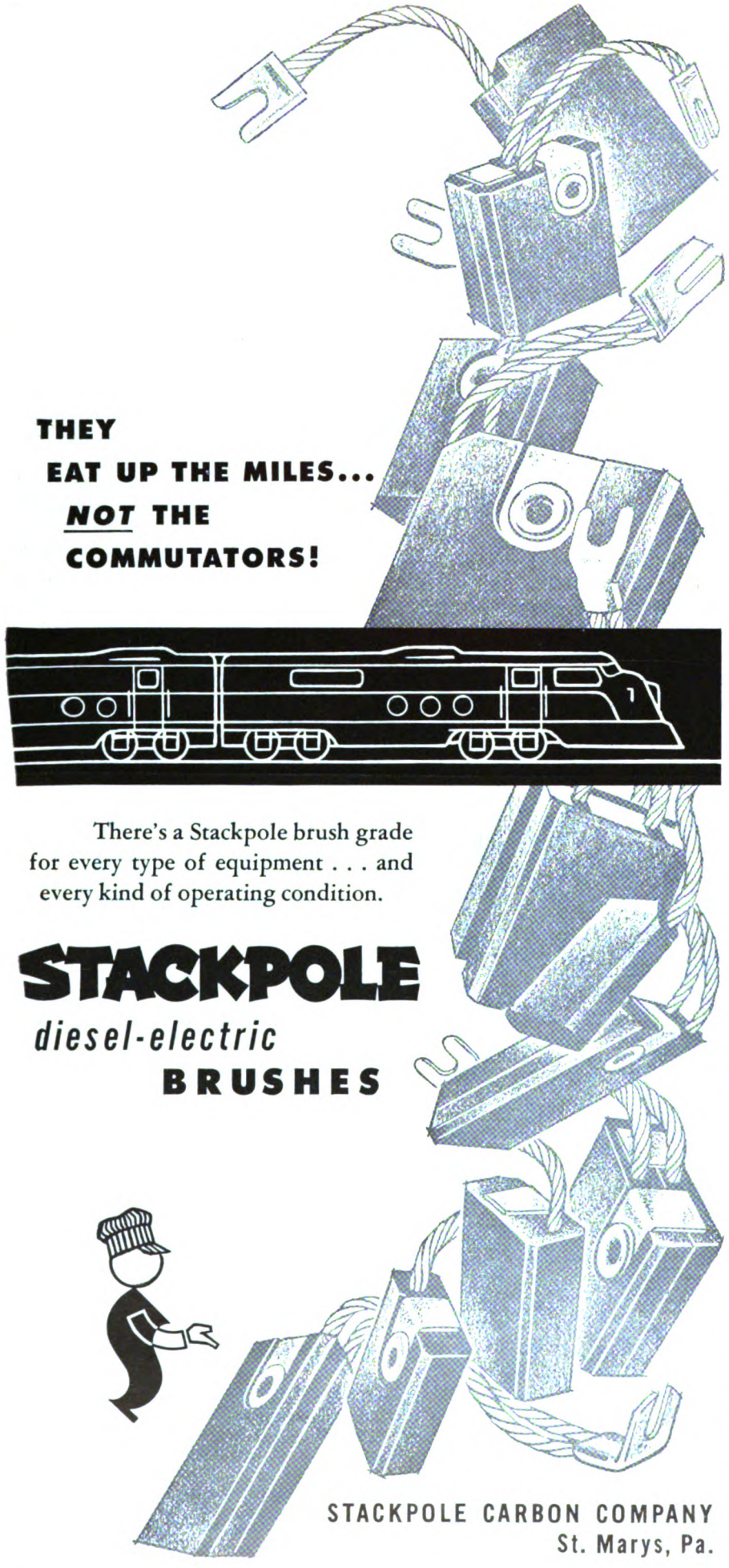
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Report

(Continued from page 5)

and stroke of the 567 engine remains th same and the exterior dimensions of th traction motor housing and armature ar unchanged from original models. Th 567-A engine, rated at 1,350 hp in the 1 cyl model, has been increased to 2,400 i the 567-D3 for application to the six-moto SD-24 locomotive. Traction motor hors power has been almost doubled—fro 337.5 in the D-7 to 562.5 in the D-57. A the same time, tractive effort of the 4-ax freight locomotive has been increased fro 32,400 to 50,000 lb." Mr. Terrell said th railroads have received or ordered a tot of more than 800 GP-30's. The 29 uni delivered to the L&N were built under th

Orders and Inquiries For New Equipment

Placed Since Closing of October Issue

Locomotive Orders

APACHE RY.—*Alco:* three 1,800-hp diesel-electri locomotives—12-cyl Alco Model 251. Delivered.

DELAWARE & HUDSON.—*Alco:* 12 1,800-hp diese electric units. Cost, approximately $2,000,000.

PENNSYLVANIA.—*Alco:* 15 2,400-hp diesel-ele tric freight locomotives. Approximate cos $3,600,000.

Freight-Car Orders

DETROIT, TOLEDO & IRONTON.—*Pullman-Stan* ard: 100 70-ton, 50-ft Hydroframe-60 box car Cost, $1,425,000. Deliveries to begin last week this month.

DOW CHEMICAL.—*Greenville Steel Car:* 14 thre compartment, 3,900-cu ft aluminum tank-ty covered hopper cars for moving dry bulk pol ethylene and polystyrene. To be fitted with 70-t trucks and built of Dow-produced sheet, plate, a extrusions to a design originated by Alumin Co. of Canada (RL&C, Oct. 1960, p 42).

GREAT NORTHERN.—*Pacific Car & Fdry:* 1 insulated 50-ft, 70-ton box cars equipped wi roller-bearings and Waugh super-cushion und frames. For Western Fruit Express fleet. Fo December delivery.

ILLINOIS CENTRAL.—*Company shops:* 200 5 50-ton box cars equipped with Sparton Ea Loaders.

MISSOURI PACIFIC.—*General American:* 1 70-ton, 50-ft insulated box cars; 50 2,600-c Air-Slide covered hopper cars. Box car deliver to start in December; covered hoppers, in Apr 1963.

NORTHERN PACIFIC.—*Ortner:* Five 100-t 66-ft, roller-bearing, mill-type gondola cars. Cos $15,000 per car. Delivered.

PENNSYLVANIA.—*Company shops:* 500 cust underframe box cars; 300 hopper cars.

PITTSBURGH & LAKE ERIE.—*Despatch Shop* 100 70-ton box cars. Cost, $1,545,000. Deliver under way.

Notes and Inquiries

Long Island has acquired two 1,500-hp A diesel-electric locomotives from Delaware & Hu son for use in passenger service.

New Haven seeking U.S. Court permissio purchase 50 G-85 85-ft flat cars costing $74 To be financed by the sale of outdated ro stock and other old equipment.

New York City Transit Authority has rece bids for 424 new subway cars for IRT line at cost of $109,800 a car. Bids due in December 600 new cars for BMT and IND lines.

Port Authority Trans-Hudson Corp. includes its plans to rehabilitate and modernize the Hud & Manhattan (Hudson Tubes), which it recen acquired, the cleaning and relamping of existi cars; the designing and purchase of 250 air-con tioned cars "of the most modern concept;" the i stallation of new utility systems, particularly electric power supply and distribution facili and the building of new maintenance shops a car yards.

EMD locomotive replacement plan, with the 25,000th unit replacing a 1,500-hp F3 freight locomotive shipped to the L&N in 1948. The 25,000 GM units include not only those produced by EMD, but also those built by General Motors Diesel at London, Ont., Canada, and by six overseas associate manufacturers to whom EMD ships locomotive components.

Commenting on the future, J. M. Roche, GM executive vice-president, skirted a prediction on the form of the locomotive of the future. The diesel supplanted the steam locomotive within a generation, he noted, "and this rapid takeover epitomizes what we see today in so many areas of technology —an accelerating pace of progress . . . I can assure you that our research and development program will be accelerated to meet the competitive challenge in the years ahead."

EMD, Mr. Roche said, "looks at the locomotive as a complete system with prime movers, transmissions and control equipment as integral parts of the system. These systems are under continual development and each is judged according to the economic contribution it can make."

Lubricator Pads and Spontaneous Combustion

Lubricators saturated in oil in journal boxes *do not* spontaneously catch on fire under normal rising temperatures which are below the point of classification as a hot box. In the item on page 52 of the October 1962 issue it was incorrectly stated that they do.

ASME Railroad Division Hears State Official

Dr. William J. Ronan, Secretary to the Governor of the State of New York, will be the speaker at the annual luncheon of the Railroad Division of the American Society of Mechanical Engineers on November 29. Dr. Ronan, chairman of the Tri-State Transportation Committee, will speak on transportation in the three-state area surrounding New York. The administration of New York's Governor Nelson Rockefeller in which Dr. Ronan serves has been a pioneer in providing state assistance to commuter railroads, including leasing arrangements which enabled the New York Central to place 52 air-conditioned, multiple-unit electric cars in service earlier this year (RL&C, April 1962, p 17). The Long Island has signed a similar agreement covering 30 cars.

The Railroad Division luncheon is a regular feature of the ASME winter annual meeting. Three technical sessions are scheduled by the Division on November 28 and 29. Featured will be a panel discussion on Freight-Car-Truck Design, participated in by L. S. McGregor, chief of motive power and car equipment, Canadian National; William Van Der Sluys, Pullman-Standard; C. A. Naffziger, director, Freight Loss and Damage Prevention Section, Freight Claim Division, AAR; and C. E. Tack, vice president - engineering, American Steel Foundries. Other subjects to be discussed will be Progress in Railway Mechanical Engineering 1961 - 1962; New Concepts in Freight-Car Brake Rigging; Outer Pedestal Leg of Narrow Pedestal Side Frame; Use of Canadian Crudes in Locomotive Diesel Engines; Diesel-Hydraulic Locomotives in Heavy-Duty Freight Service; and Is Rail Adhesion a Limitation on the Growth of Internally Powered Locomotives.

AAR Recommendations Are Accepted

The 52 recommendations from committees of the AAR Mechanical Division, made at the June meeting in Chicago and submitted for letter ballot action, have been approved. Effective dates were set for all except the proposition to adopt an Interchange Rule permitting the application of roller bearings to integral-journal-box side frames if the frames are not over 25 years of age. This was referred back to the Arbitration Committee for further study.

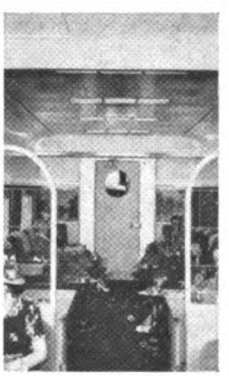
Recommendations from the Committees on Specifications for Materials and Couplers and Draft Gears are effective March 1, 1963, except revision of Specification M-914, effective Jan. 1, 1963 to provide for a revised brake cylinder lubricant for more efficient train operation in severe cold weather. Effective dates of other propositions include adoption of the flat back bearing and wedge as alternate standard, and the new standard freight car wheel designs as of March 1, 1963. Modification of the type A cast steel

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wheel to provide a straight 1 in 20 taper in the tread instead of a double taper is effective Nov. 1, 1962.

Lube Oil, Lubricators Are ASTM Topics

Oxidation stability of diesel-engine lubricating oils and the optimum quantity of oil to be placed in pad-equipped freight-car journal boxes were topics discussed at last month's Railroad Symposium in Los Angeles. The session was sponsored by the American Society for Testing and Materials.

As a result of an accelerated oxidation stability test developed by the Technical Research Department of the New York Central, the railroad is now using lubricating oils which have yielded significant reductions in diesel engine maintenance. About two years ago, one group of Alco road switchers in the Eastern District and another group of EMD road switchers in the Northern District began to develop bearing problems. According to R. H. Wright, manager of the NYC research laboratory, investigation showed not only bearing corrosion but also oxidized lubricating oil and depleted additive.

Although the railroad was then using twelve different types of oil, it developed that the two groups of locomotives were being supplied with the same type. It subsequently was proved that six of the twelve oils then approved showed characteristics which could produce such engine failures with the brand used on the two groups of locomotives having the poorest qualities.

This resulted in a new evaluation of the tests used by the NYC to approve diesel engine lubricating oils. "It was decided a test should be developed which would rate oils by their oxidation stability, as this appeared to be the main criterion of quality which would assure an oil's standing up to the hard type of service expected of it." The result was the new 6-hr test which has replaced the former 72-hr stability test. "If the instability of an oil is plotted against time of oxidation," said Mr. Wright, "it will be readily seen that the curve representing the more stable oil will be flat longer, the breakdown coming considerably

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er the 6-hr run time . . . It has been ınd to be possible with this test to de-mine the best additive package for a lube base stock or combination of stocks."

Over the past five years the Pennsylvania s operated test trains which were used to ıluate the performance of journal lubri-ors and to determine the box servicing ıctices which should be adopted. Intro-cing this problem, M. A. Pinney, engineer ts, said that the basic deficiency of waste journal boxes was its failure to maintain constant contact with the journal sur-e necessary to assure a continued flow oil to the bearing. Temperatures and ɔrations which develop in journal boxes ıke it impossible to prevent loose waste cking from settling away from the jour-l. "Lubricating pads have overcome this ficulty and are able to maintain continu-s contact with the journal, thus maintain-g oil feed to the bearing," said Mr. Pinney. Experience indicated that, to obtain satis-ctory results with waste-packed boxes, it ıs necessary to "set up" the packing at ıst once every 400 to 500 miles. With ɔricators, it is not necessary to do any-ng to restore their resiliency and assure ntact with the journal. "This is," said Mr. nney, "when the matter of frequency of ention for lubricators becomes not a oblem of restoring resiliency, but a prob-n of the frequency of oiling and the oil el necessary to maintain a satisfactory te of oil feed." Based on the large number runs made with its lubricator test train, Pennsylvania test department came to following conclusions:

- The temperature at which the bearing a particular axle operates does not ap-ar to be a function of the lubricator ɔne, but rather a function of the lubri-tor bearing and journal combination;
- Oil consumption with lubricators ving free oil levels of ½ in. or less is aterially less than that of boxes having l levels higher than ½ in;
- Lubricators have an inherent ability operate for long distances on the oil aked up within the lubricator itself;
- Oil consumption may vary consider-ly, depending on the brand of lubricator ing used.

"In addition to the hot-box performance cord," Mr. Pinney concluded, "other fac-rs must be considered in evaluating the lue of individual lubricators in relation their cost. Included are relative oil con-mption and the ability to operate extended ileages after all free oil has disappeared."

ersonal Mention

ltimore & Ohio. — *Baltimore, Md.:* EORGE M. BEISCHER, newly appointed as-stant chief mechanical officer (RL&C, ct. 1962, p 56), began railroad career as special apprentice on the New York Cen-al. Following service as a captain in the rmy Air Force, he returned to the NYC here he served successively as special in-ɔector, general foreman, assistant master ıechanic, shop superintendent, master me-



George M. Beischer
B&O



Walter C. Kresge
WMd

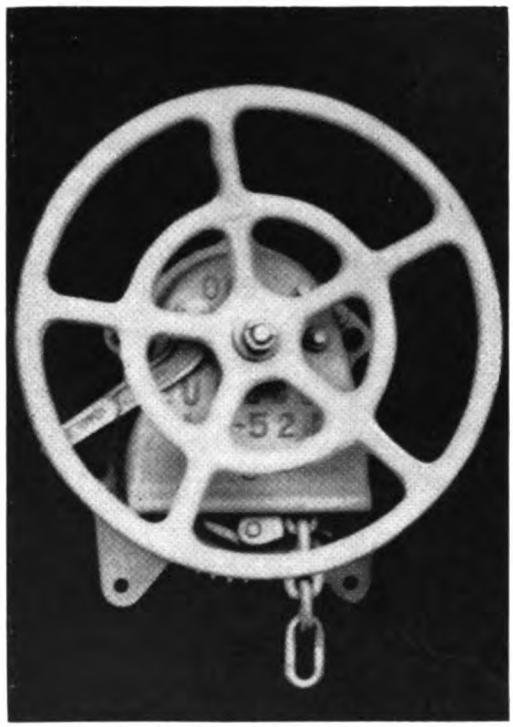
chanic, and assistant mechanical superintendent. In 1958 he became assistant superintendent motive power of the Western Maryland at Hagerstown, Md. He recently resigned as chief mechanical officer of that road to become assistant chief mechanical officer of the B&O.

Birmingham Southern. — *Fairfield, Ala.:* E. F. NICHOLS, master mechanic, appointed superintendent—maintenance.

Boston & Maine. — *Boston, Mass.:* J. A. HESELTON, assistant superintendent car maintenance, appointed superintendent car maintenance.

Chesapeake & Ohio — *Huntington, W. Va.:* T. P. HACKNEY, JR., appointed general superintendent car department, succeeding H. J. BAKER, retired. Mr. Hackney formerly assistant to chief mechanical engineer at Richmond, Va. E. E. SLACK, assistant superintendent motive power, work simplification and personnel, appointed staff assistant to chief mechanical officers. S. M.

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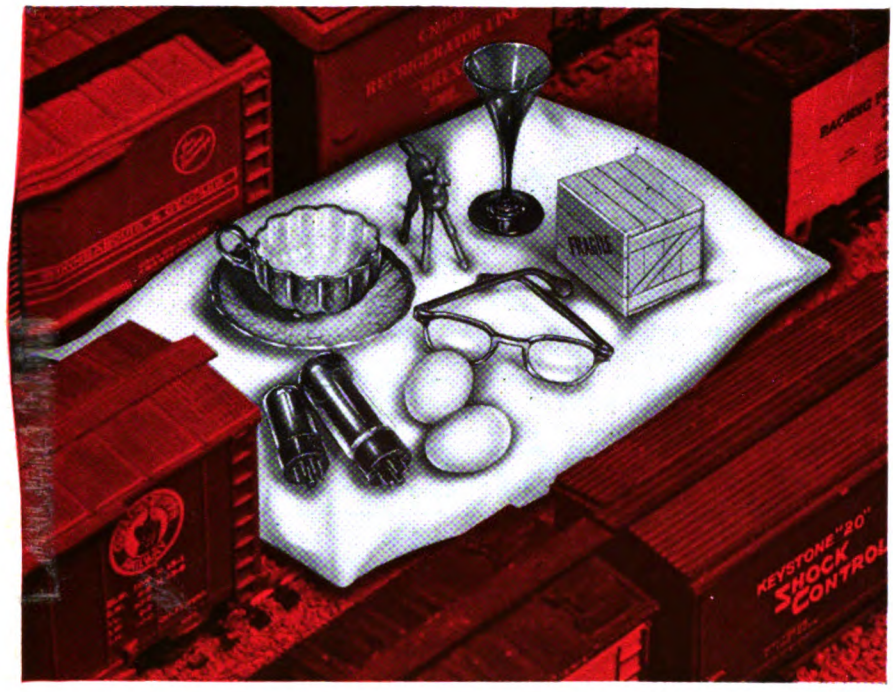
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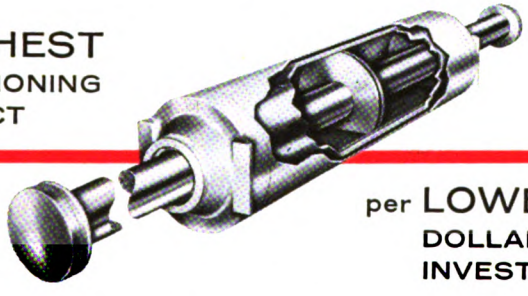
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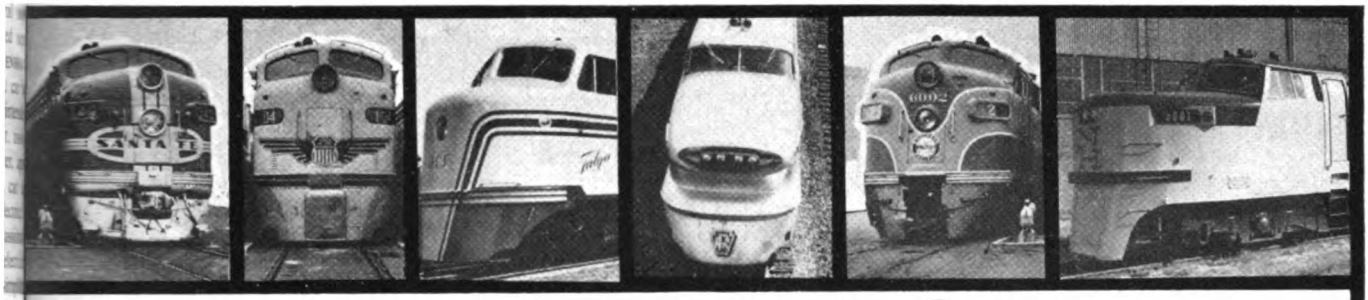
EHRMAN, assistant general superintendent car department, appointed superintendent car department. E. J. HENSHAW, assistant to general superintendent car department, appointed assistant superintendent car department. A. N. GILBERT, assistant to superintendent motive power, appointed assistant to superintendent car department. C. R. BLAND, assistant electrical engineer rolling stock, appointed assistant superintendent motive power—electrical. J. M. KIGGIN, supervisor work simplification, appointed assistant to mechanical engineer. F. L. WHITMER, assistant engineer—locomotives, appointed supervisor — diesel. J. A. BARRON, JR., assistant engineer — diesel, appointed assistant supervisor—diesels. M. P. WINSTON, assistant to assistant superintendent motive power—diesels, retired. W. P. HIGGINS, JR, appointed assistant to general air-brake inspector. *Grand Rapids, Mich.:* C. A. THOMAS, district car foreman, appointed assistant superintendent car department. W. J. DUFFY appointed superintendent special equipment—mechanical. MACK RANEY appointed assistant mechanical engineer. *Hinton, W. Va.:* ULYSSES G. CLEMONS appointed general foreman, Hinton shops, succeeding J. HOBSON MARKS, retired. *Clifton Forge, Va.:* RICHARD V. JOHNSON, enginehouse foreman, appointed assistant shop scheduling engineer. *Newport News, Va.:* HOWARD E. BOSTER, SR., appointed general foreman—piers.

Milwaukee. — *Milwaukee, Wis.:* ARTHUR W. HALLENBERG, general superintendent motive power (RL&C, April 1962, p 42), appointed assistant chief mechanical officer. J. J. DRINKA, assistant to car department superintendent, appointed assistant to chief mechanical officer, Milwaukee shops.

New York Central. — *New York:* E. H. WRIGHT appointed chief mechanical superintendent—locomotive. Mr. Wright formerly mechanical superintendent, Southern district, at Indianapolis, Ind. F. A. DANAHY appointed chief mechanical superintendent—car. Mr. Danahy formerly chief mechanical engineer. F. W. KREIDLER appointed director of systems and controls—mechanical. *Beech Grove, Ind.:* H. C. HAUPT appointed superintendent shop, succeeding Carrold Stevenson. Mr. Haupt formerly district car inspector at New York. G. W. SCHMIDBAUER appointed general foreman, freight shop. *Rochester, N. Y.:* CARROLL STEVENSON appointed superintendent shops, succeeding Mr. Schmidbauer.

Pacific Fruit Express.—*San Francisco, Cal.:* EARL V. HOPKINS, assistant general superintendent car department, appointed general mechanical and engineering officer, succeeding G. P. TORBURN, retired.

Western Maryland.—*Hagerstown, Md.:* WALTER C. KRESGE, newly appointed chief mechanical officer (RL&C, Oct. 1962, p 56), entered railway service in 1939 as a special apprentice on the Lehigh Valley. Subsequently, he was general car foreman, LV research engineer and production test engineer, American Locomotive Co. (now Alco Products, Inc.); general diesel supervisor, Delaware & Hudson; assistant general superintendent and general superintendent, Pittsburgh & West Virginia; and superintendent of equipment and superintendent car equipment, Western Maryland.



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W. F. Flickinger
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EROQUIP CORP., BARCO DIV.—*James . Heyworth* appointed general manager. [r. Heyworth formerly vice-president of dustrial sales for the Barco Manufactur- g Co. which has transferred all of its)erating assets to Aeroquip. Barco plant cated in Barrington, Ill.

■

'MINGTON WAYNE CORP.—*W. Fred 'lickinger,* sales engineer, Symington Di- sion, appointed to newly created position general sales manager of the division.

■

OLLAND CO. — *Daniel C. Prescott,* estern regional sales and service repre- ntative, has retired.

■

APOR CORP.—*W. W. Parks* appointed ief engineer, with responsibility for de- lopment, design and engineering of rail- ad and transit products.

■

LCO PRODUCTS, INC. — *Eugene J. rown* appointed western regional manager r diesel locomotive and engine renewal arts. Also appointed renewal parts repre- ntatives: *Theodore E. Fryar* (Los An- les), *Ellsworth Hutchinson* (St. Louis), *mes P. Sullivan* (Washington, D.C.) and *hn H. Chandler* (North Bergen, N.J.)

■

/ESTINGHOUSE AIR BRAKE CO., /ESTINGHOUSE AIR BRAKE DIV.—*John W. lorris* appointed Southwestern District anager, with headquarters at St. Louis, lo., succeeding *E. A. Frauenthal,* retired.

R. E. Fischer appointed Southeastern District engineer, with headquarters at Washington, D.C., succeeding *Oscar Bergman,* retired.

■

ADAMS & WESTLAKE CO.—New York office moved to 744 Broad St., Newark, N.J.

■

J. W. MORTELL CO.—*Harry A. Lowry & Associates,* 14643 Burbank Blvd., Van Nuys, Calif., appointed West Coast railway supply representative.

■

GOULD-NATIONAL BATTERIES, INC., INDUSTRIAL BATTERY DIVISION. — *G. P. Millington, Jr.,* appointed general sales manager. *K. A. Vaughan,* regional manager in charge of sales and service, Northeastern Marketing area, Trenton, N.J., appointed Central Marketing manager. *Andrew G. Howard* appointed regional sales manager, Pittsburgh area.

■

STANRAY CORP., STANDARD RAILWAY EQUIPMENT DIV.—*H. L. Kent* named president and general manager, succeeding *W. E. Olds,* retired. *Arthur A. Frank, Jr.,* named vice-president.

■

SCULLIN STEEL CO.—*William C. Irish* named sales representative at New York.

Trade Publications

(To obtain copies of publications, circle corresponding numbers on coupon below.)

62. JOURNAL BEARING DESIGN. Booklet A-4591 explains factors affecting journal-bearing design—speed, load, operating temperatures, clearances, surface finish and bearing materials. Sun Oil Co.

63. HEAVY-DUTY TOOLS. Bulletin PL-1507 on heavy-duty tools with throw-away inserts lists ten sizes of holders for two-edged, positive rack inserts stocked in K2S and K6 grades. Gives prices. Kennametal, Inc.

64. WIRE MARKERS. Stocklist covers line of self-adhering E-Z Code Wire Markers for use in high-temperature applications; markers resistant to water, oils, and solvents; and markers meeting military specifications. Western Lithograph Co.

65. CENTRIFUGAL WHEELS. Blast-cleaning and descaling Booklet 2318 discusses horsepower, velocity and abrasive flow of centrifugal wheels, their interrelation and how these factors affect cleaning speed and cost. Pangborn Corp.

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November, 1962

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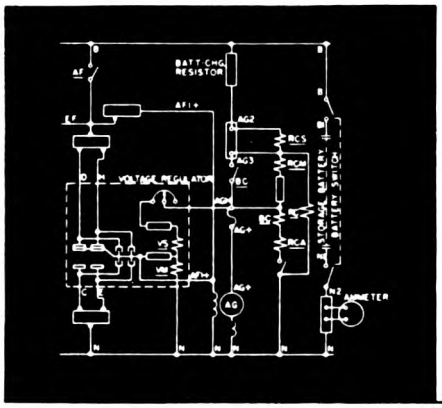
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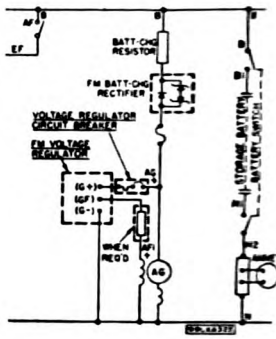
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Published monthly at Newark, New Jersey for November, 1962.

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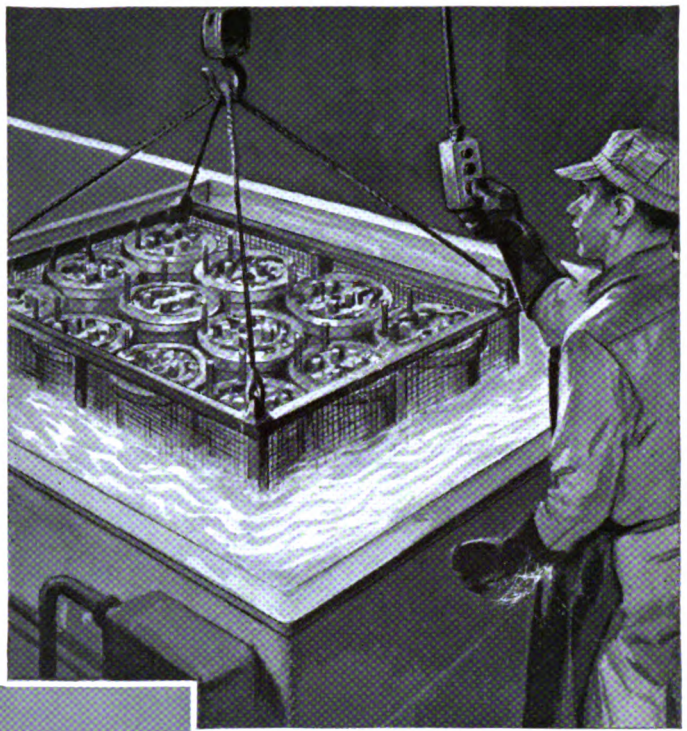
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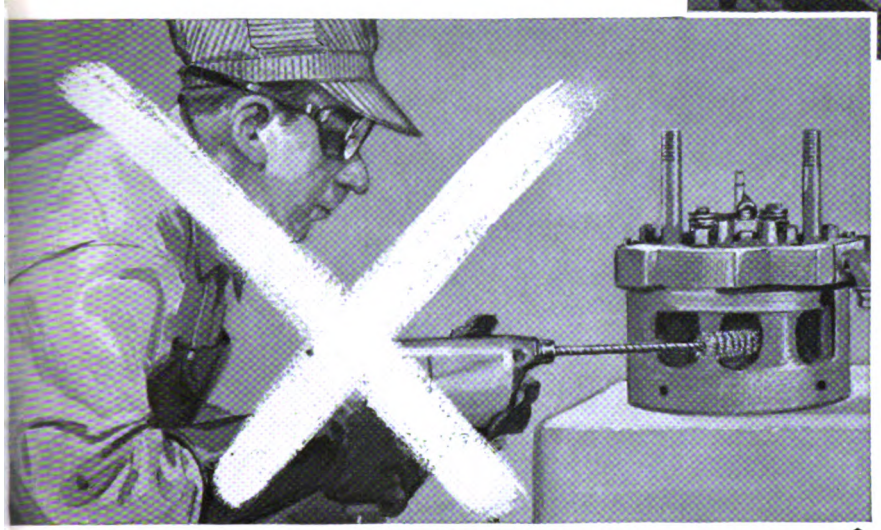
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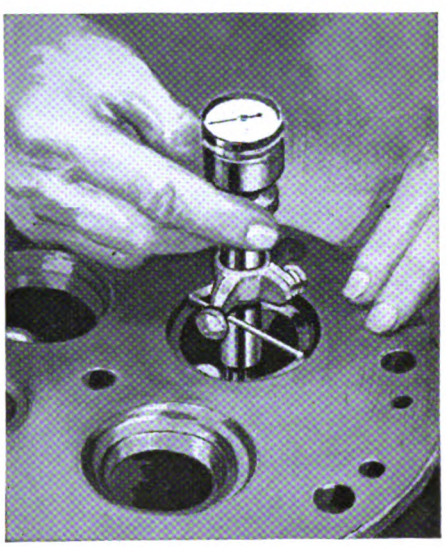


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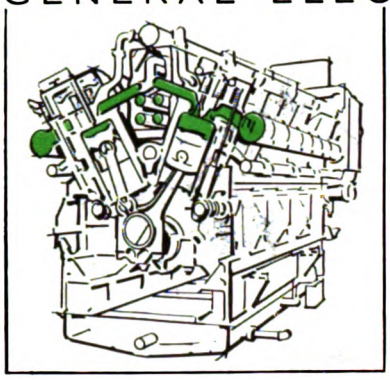
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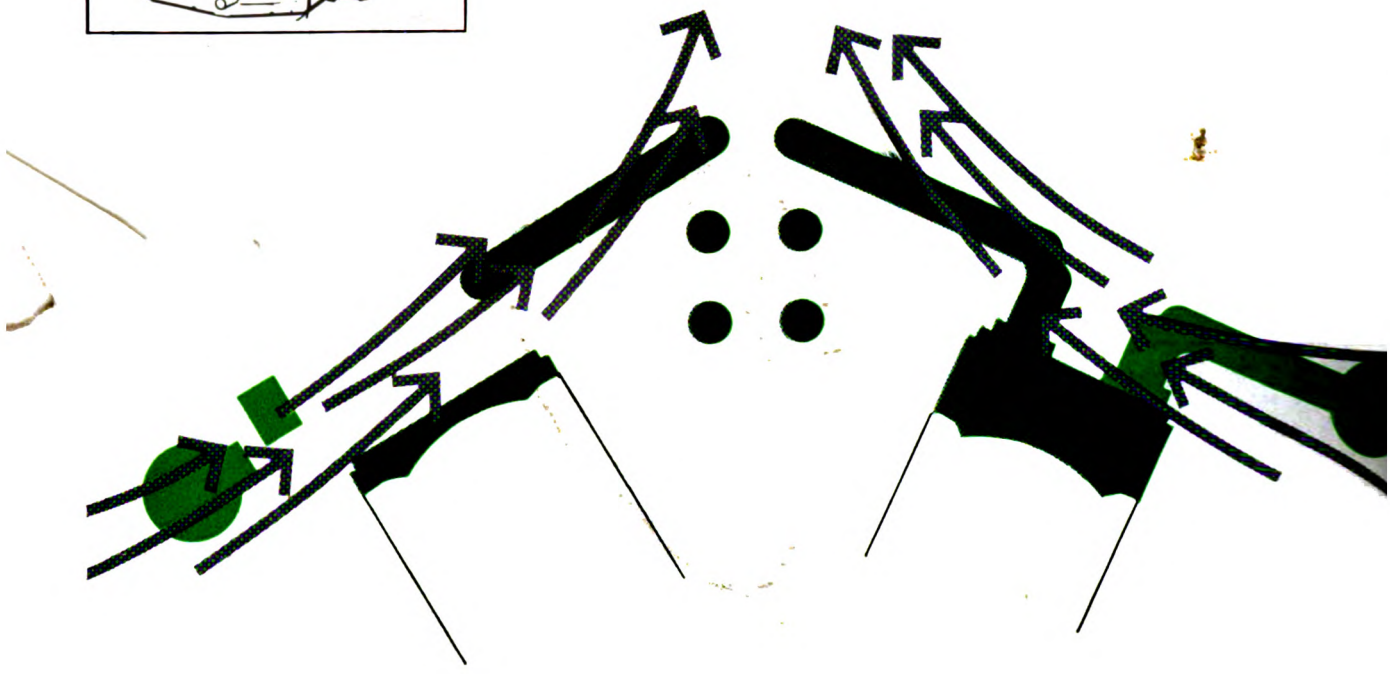
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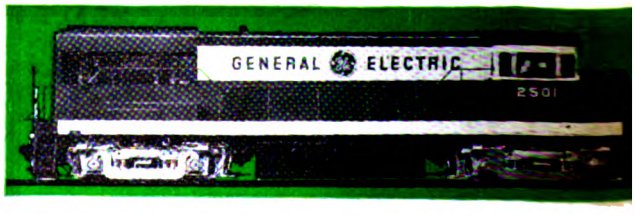
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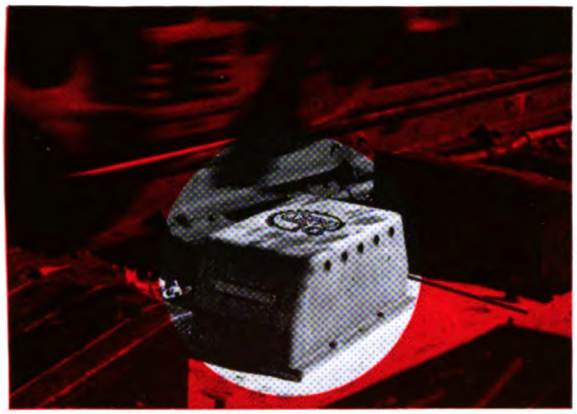
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RF&P's Consolidated Shop page 21

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Figure 1—Tests prove that the trailing and leading surfaces of the journal box present the optimum accessible areas for hot box inspection. Presenting a low-mass path of thermal flux from the bearing, the trailing surface responds most rapidly to actual bearing temperature changes.

Figure 2—Illustration of typical bearing assembly shows how infrared SERVOSAFE Hot Box Detective detects heat. T_1 is the temperature of the journal-bearing interface. T_2 is the proportional temperature conducted to the trailing surface of the journal box.

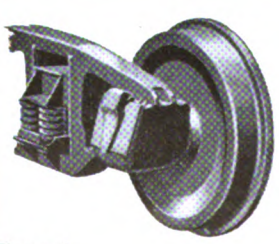


Figure 1

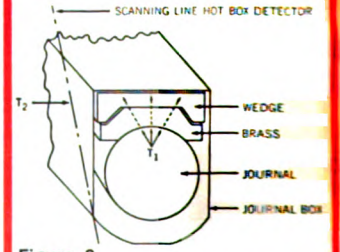


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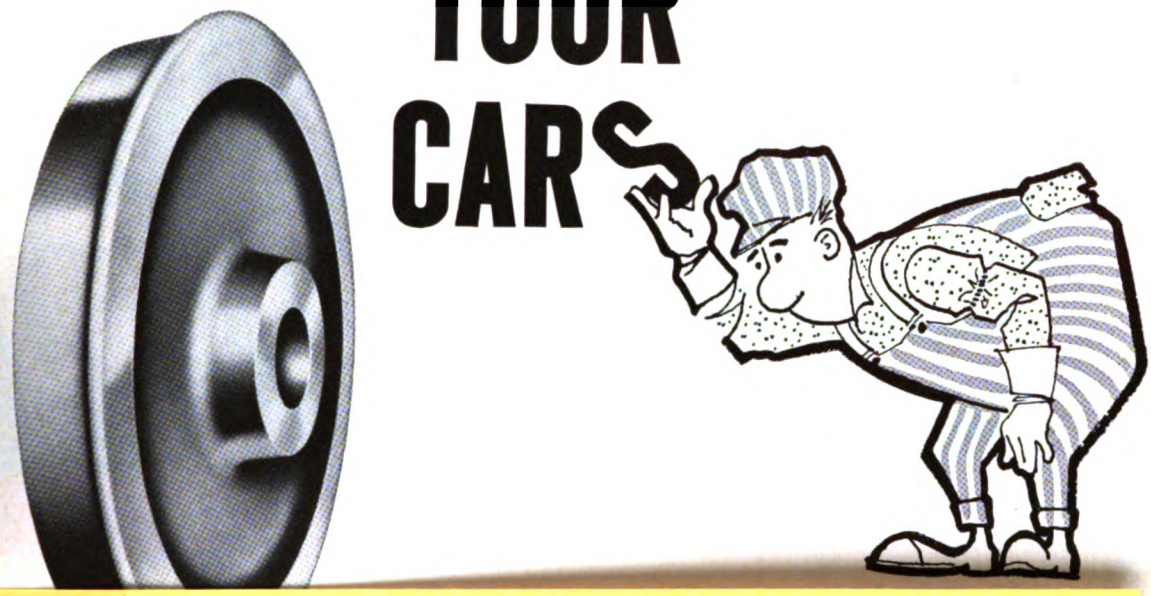
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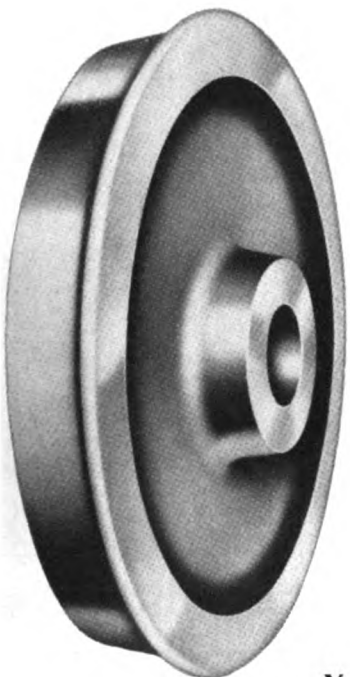
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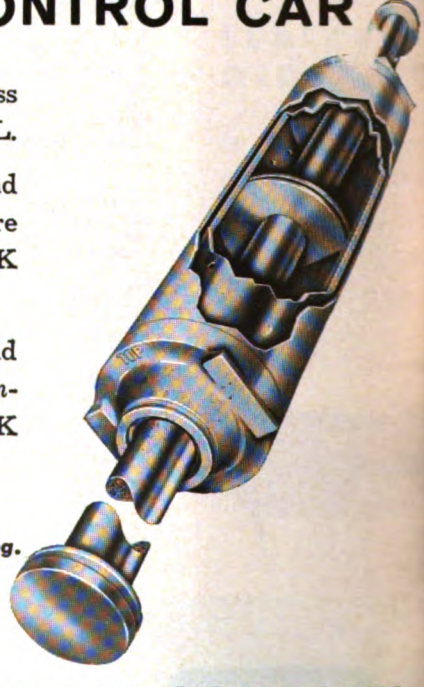


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America's Oldest Trade Paper
December, 1962—Vol. 136, No. 12

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Package Brakes Find Wider Application

Package brake systems offer several advantages over conventional brake rigging on freight cars, G. M. Cabble, Jr., Westinghouse Air Brake Co., told the Railroad Division of the American Society of Mechanical Engineers in New York last month. Only in the past few years has attention been given to the development of truck-mounted freight-car brake packages not based on very old concepts and design.

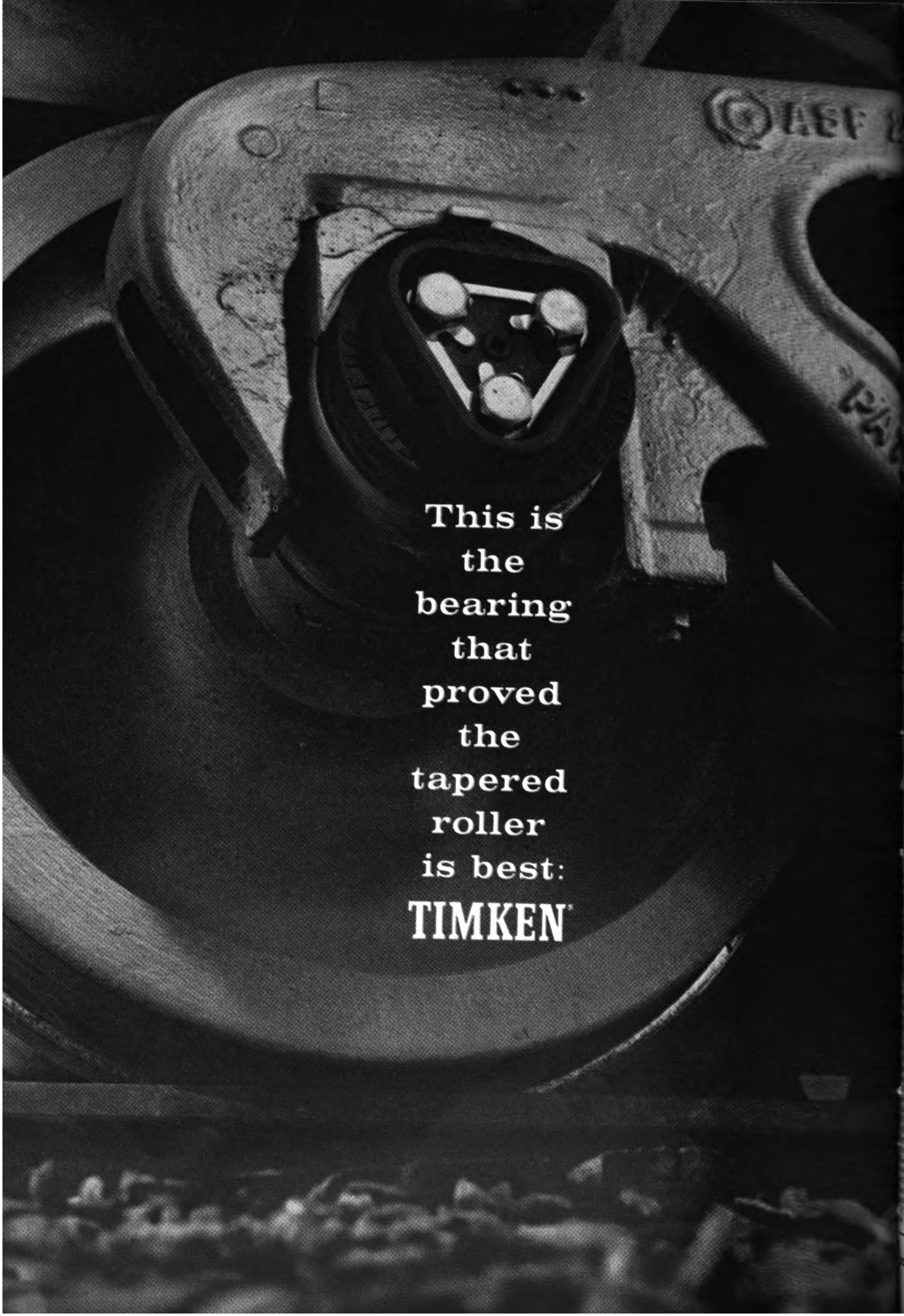
Package brakes now available include the American Steel Foundries Unifrate Brake *(RL&C, Oct. 1962, p. 59)*, Budd Frate Brake *(RL&C, Oct. 1958, p. 12)*, Buffalo Brake Beam Brake X *(RL&C, Sept. 1957, p. 88)*, and Westinghouse Air Brake Wabcopac *(RL&C, Sept. 1959, p. 15)*. Advantages of the new designs include:

- Greater efficiency than conventional rigging;
- Simplification of car construction;
- Increased payload resulting from lower brake-system weight;
- Ability to utilize different types of shoes;
- More uniform wheel wear at reduced rates.

Each of the package brakes has its own advantages and certain limitations, the Westinghouse staff engineer told the meeting. "Probably the most serious drawback to any of the new systems is the conventional brake methods," Mr. Cabble said. "The new systems have to be designed to be compatible with cars equipped with conventional rigging. All cars must respond and perform somewhat alike for proper train handling . . . It will take many years to obtain the overall effects of the modern freight brake packages. As the percentage of package-equipped cars increases, all railroads will benefit from improved train handling, better braking ability, and lowered maintenance costs."

He pointed out that conventional rigging involves two very important variables which can greatly affect braking performance of a freight car. The first is rigging efficiency. The levers, pins, rods and brake beams incorporate a number of points where efficiency losses are encountered. Friction points, tolerances on various lever holes, and lever angularity are some of the spots where braking force is reduced. Westinghouse tests showed rigging efficiencies varied from less than 50% to almost 80% at 50 psi brake cylinder pressure. There is also variation with cylinder pressure; conventional rigging becomes very inefficient at low cylinder pressures. The other important variable is brake shoe friction, which changes with speed in the case of cast-iron shoes. Individual shoe forces are not uniform. On an 85-ft piggyback car with conventional rigging it was found that rigging efficiency at the various wheel locations varied from 37.9% at the R-4 position to 57.0% at the L-1 position. Inspection of the rigging extending from one end of the car to the other is complicated and tedious.

(Continued on page 7)


This is
the
bearing
that
proved
the
tapered
roller
is best:
TIMKEN®

eport

(Continued from page 5)

of E Unions Seek Stabilization

x unions representing 150,000 mainte-e of equipment employees are seeking stabilization agreements with approxi-ely 100 railroads. Heart of the job sta-ation move is the attack on "farming shop work. The notices filed by the all members of the AFL-CIO Railway ployees Department, ask that protection mployees provided by the Washington Protection Agreement of 1936 be ex-ded to cover employees affected by a long of organizational or operational changes addition to changes brought about by ger or consolidation. This would in-de employees adversely affected by tech-ogical improvements, labor saving de-s, or any operation change not resulting ly from a decline in traffic.

nvolved are the Machinists, Sheet Metal rkers, Carmen, Boilermakers & Black-ths, Electrical Workers, and Firemen & ers. Railroad employment has dropped stically in the past decade. ICC reports w that average railroad employment was 26,663 in 1952. In May 1962 total em-yment was 715,000. In the same period ratio of maintenance of equipment and es employees to total employment pped from 28.17% in 1952 to 23.25% 1962.

M. Fox, president of the AFL-CIO Rail-y Employees Department, said that the rming out evil" has grown steadily and t railroads are using "all sorts of gim-micks to eliminate shopmen's jobs." He said that the practice of trading in old equipment for rebuilt equipment has prevented railroad shop men from doing rebuilding work. "This situation has been accumulating for a long time and has become intolerable. Railroads have been unilaterally deciding they can consolidate what work they please, or give it away to outside firms without consulting the unions in any way."

Here is the proposed mechanical-craft job stabilization plan:

- Only mechanics or apprentices regularly employed as such shall do mechanics' work of their craft as per the special rules thereof, and no work of any craft covered by such agreements shall, under any circumstances, be performed by any official, supervisory officer, or by employees who are employed in another craft; except at points where it is agreed that there is not sufficient work to justify employing a mechanic of each craft and agreement is reached between the carrier and the general chairmen of the crafts involved, arriving at special arrangements for the performance of work at such points.
- Motor vehicles (passenger or truck) used for road service will be driven by an employee of the craft whose work is to be performed.
- In case of any violation of this rule, the employee or employees who would have performed such work if it had been performed without violation of this rule, shall be compensated on the same basis as if they or he had performed the work.
- Except by special agreement as to specifically described work (made in each

(Continued on page 48)

Orders and Inquiries for New Equipment

Placed Since Closing of November Issue

comotive Orders

ATLANTIC COAST LINE.—*Electro-Motive:* 9 GP-2,250-hp diesel electric locomotives. Cost, over 500,000. Delivery to begin in January.

NORFOLK & WESTERN.—*Electro-Motive:* 44 2,250-GP-30 road switchers. *Alco:* 6 1,800-hp road tchers.

NORFOLK, FRANKLIN & DANVILLE.—*Alco:* two 00-hp diesel-electric locomotives.

eight-Car Orders

AKRON, CANTON & YOUNGSTOWN.—*United ates Railway Equipment:* 260 50-ton all-steel de-door box cars. On lease. Delivery scheduled completion in first quarter of 1963.

ATLANTIC COAST LINE.—*ACF:* 300 70-ton cov-ed hopper cars. Approximate cost, $3,250,000. elivery to begin in February at rate of 16 cars r day.

BURLINGTON. — *Company shops:* 250 70-ton, -ft insulated box cars; 100 mechanical refrigera-rs. For lease to Burlington Refrigerator Ex-ess Co. Deliveries to begin after January 1.

NEW YORK CENTRAL.—*General American:* 50 -ton insulated box cars. *Greenville Steel Car:* 0 Flexi-Van flat cars. Cost, $1,263,000. De-eries of orders to begin this month. *Merchants spatch:* 150 tri-level cars. Leased.

NORFOLK & WESTERN.—*Pullman-Standard:* 14 -ton autoparts box cars. Cost, $282,000. *Gen-al American:* 10 Airslide covered hopper cars. st, $151,000. *Ortner:* 12 50-ton bulkhead flat rs for transporting plasterboard; 5 70-ton gon-la cars with bulkheads and removable roofs. rders delivered. *Company shops:* 1,000 85-ton ller-bearing hopper cars. Cost, approx. $10,900,-0. Production to begin after a 1,000-car order placed last year but not announced) is com-eted in January. "Authorization of order en-uraged by new U.S. Treasury Department rail-ad equipment depreciation schedules and the vestment tax credit provisions of the Revenue ct recently passed by Congress," according to arry C. Wyatt, N&W vice-president and general anager.

PACIFIC FRUIT EXPRESS.—*Pacific Car & Fdry.:* 0 multi-purpose mechanical refrigerator cars, equipped with cushion underframes, load dividers, roller bearings, and 8-ft wide doors. Cars to be almost 57 ft long and capable of carrying up to 70 tons of freight in 4,000-cu ft lading compartment. Refrigeration units will be able to maintain constant temperatures ranging from below zero to 70 deg F for as long as 20 days without refueling. Deliveries to begin in February and completed by April.

RICHMOND, FREDERICKSBURG & POTOMAC.—*Pullman-Standard:* 100 50-ft box cars with cushion underframes. Cost, $1,530,000. Delivery to begin in February.

ROCK ISLAND.—*Pullman-Standard:* 50 85-ft piggyback flat cars; 21 89-ft multi-level flat cars.

SANTA FE.—*Pullman-Standard:* 500 70-ton, 50-ft insulated box cars, equipped with roller bearings and cushion underframes. Approx. cost, $9,000,000.

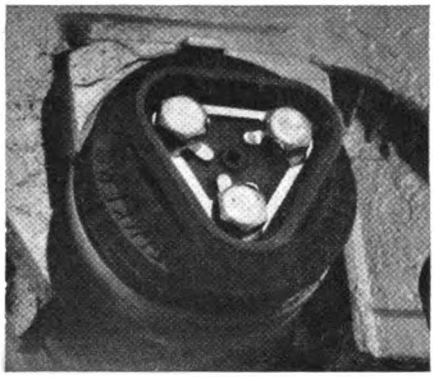
SEABOARD.—*Pullman-Standard:* 300 50-ft, 70-ton box cars with cushion underframes and load securing devices. Cost, $4,590,000. *Magor:* 25 jumbo aluminum covered hopper cars. Cost $625,000. *Thrall Car:* 250 70-ton woodrack cars with fabricated steel underframes. Cost, $2,357,000. *General Steel Industries:* 50 woodrack cars with cast-steel underframes. Cost, $650,000. Deliveries to begin in February and completed by March 1963.

Notes and Inquiries

Erie-Lackawanna undertaking a repair program to upgrade 700 50-ton box cars at Meadville, Pa., shops. Repairs consist of relining interior walls, new floors, repainting exteriors, and other reconditioning to bring cars up to standard for highest classification loading. Eight cars being completed each day.

Louisville & Nashville, as part of car restoration program, is rebuilding 500 50-ton coal hopper cars at its South Louisville shops. Preassembled car sections are being supplied by Pullman-Standard. Twelve cars scheduled for completion each work day.

Port Authority-Trans Hudson Corp. seeking bids for 250 air-conditioned transit cars for former Hudson & Manhattan lines. Estimated cost, $25,000,000. Delivery expected to begin by March 1964. New cars to replace 186 units up to 54 years old.



PROVED THE TAPERED ROLLER BEST

Back in 1929, there were four different kinds of anti-friction bearings offered to the railroad industry. Problem was, which one could do the job most efficiently, most economically.

The Timken Company solved it. Today virtually all anti-friction railroad bearings purchased are of tapered design. And most manufacturers have switched to this concept pioneered by the Timken Company.

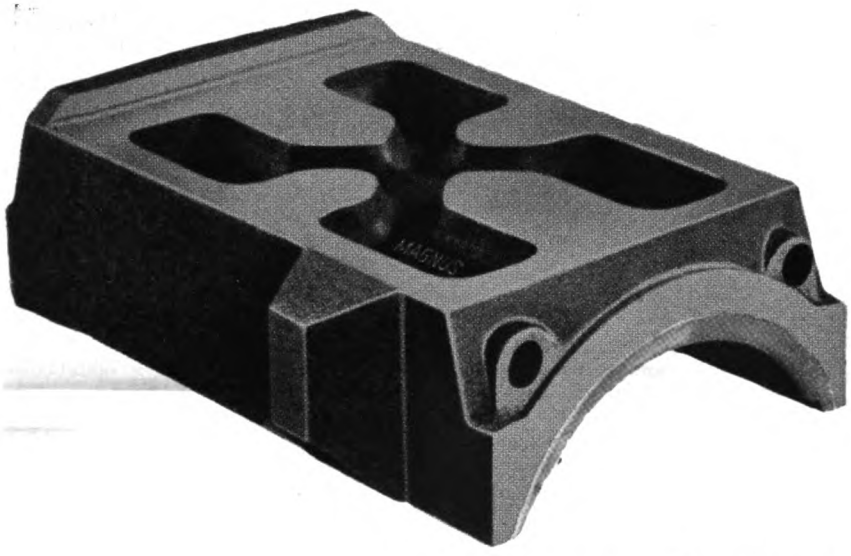
Timken® railroad bearings have proved that the tapered design is best with millions and millions of trouble-free miles—even in high-speed, heavy-duty service on America's freight cars. On the average, Timken heavy-duty "AP" bearings roll over one-hundred million car-miles between setouts due to overheated bearings. They reduce terminal bearing inspection time drastically and cut lubrication cost as well. Timken tapered roller bearings are precision-made from our own nickel-rich steel to insure the high uniform quality needed in rugged railroad service.

Today, 111 railroads and other car owners have found that Timken railroad bearings are one of their best investments in lower operating and maintenance costs and in faster, more dependable service. The Timken Roller Bearing Company, Canton 6, Ohio. Also makers of fine alloy steel and removable rock bits.

QUALITY TURNS ON HEAVY DUTY

TIMKEN®

TAPERED ROLLER BEARINGS



Now, flat-back bearing

can be applied witho

More and more railroa

regularly – to stabili

workable, get still mo

hot box setout. Here

bearing performan

Magnus flat-back bearings effectively stabilize journals during all normal operation—stay seated on the journal and provide uninterrupted lubrication. By limiting fore-and-aft movement, they make rear seals last longer—keep the oil in and dirt out of the journal box. They *cost nothing* to install.

Even now, solid bearings average a 1,000,000 miles per hot box—cost le own and operate than the cost of m *owning* roller bearings. With Magnus backs, it's expected that miles per ho will reach 2,000,000 or more—and sa too will multiply.

e AAR alternate standard–

striction to interchange cars.

)w apply flat-back bearings

urnals, make rear seals

iles per bearing and per

)w they can improve your

and save money, too!



CURRENT ECONOMICS OF SOLID BEARING OPERATION

New economic study updates solid bearing costs as reported by the AAR in 1954. Shows how lubricators have cut these more than half despite very significant rises in wage rates and material costs. For your free copy, write to: Magnus Metal Corporation, 111 Broadway, New York 6, or to 80 East Jackson Boulevard, Chicago 4.

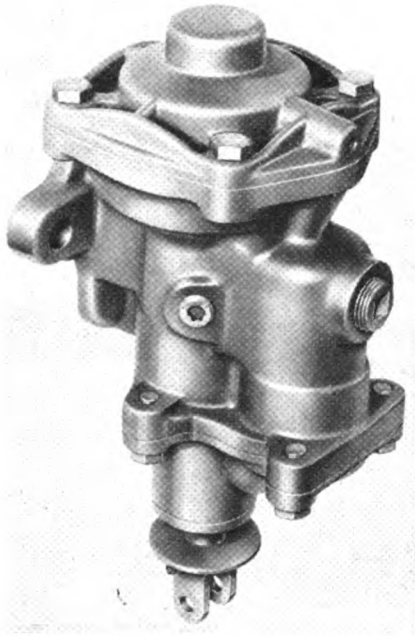
MAGNUS

METAL CORPORATION

Subsidiary of

NATIONAL LEAD COMPANY

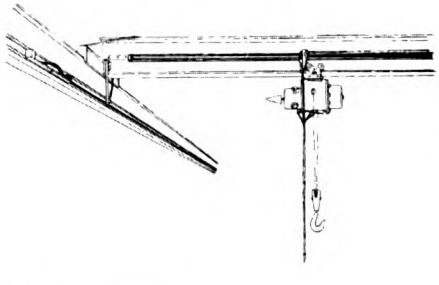
What's New in Equipment



Cylinder Release Valve

A QRB brake cylinder release valve, together with right- and left-hand adapters, is now available to take the place of the former QRR type. The QRB valve which is designed to mount on all new or existing brackets and adapters, retains most internal parts and the proven valvular construction and snap action of the former design. It employs a new by-pass valve unit which insures normal functioning when preparing to "bleed" cars for switching, yet provides an automatic reset if unintentionally operated in a train with a light brake application in effect. The new equipment has been certified by the A.A.R. as meeting all requirements of current specifications that became effective August 1, 1962. *New York Air Brake Co.*

For more information, circle 12-1 on card following page 52.



Hose Carrier

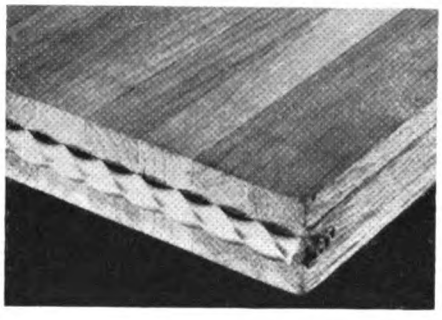
Long, swinging hose loops are eliminated on the Travel Air Hose Carrier which protects the hose inside a conduit type track mounted on crane bridge and runway. Hose only half the length of that used with the old looped hose trolley system is needed. The carrier is produced for use with ¾-in. and 1-in. hose. Each installation consists of a center track unit with extension tracks in 5- and 10-ft lengths. Ingersoll-Rand Co.

For more information, circle 12-2 on card following page 52.

Epoxy Adhesive

Epoxy adhesive J-1184 is a clear, amber liquid that can be cured at room temperature or heat cured. It has low exothermic qualities and is said to have excellent impact resistance. With E-9 curing agent, it is recommended for bonding sheet urethane to various surfaces. When mixed with E-34 curing agent, its low viscosity lends itself to applications in casting, potting and encapsulating electrical parts. It is also available with E-25 curing agent for bonding urethane roll coverings to metal cores. Armstrong Cork Co.

For more information, circle 12-3 on card following page 52.



Spiral Aluminum Pins

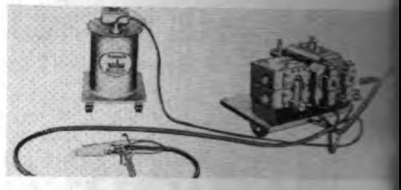
Spiral aluminum pins replace steel dowels in assembling Doweloc hardwood flooring and lining panels. The pins, produced to closer tolerances and with deeper flutes than former steel units, are extruded in Alloy 6062 and are ⅜ in. in diameter and 11¾ in. long. Panel strips, $^{13}/_{16}$ in. thick and ranging from 1¼ to 2⅜ in. in width, are turned on edge and joined by tongue and groove, then locked together and held firmly by the aluminum dowels. Width of panels is 12 in. and maximum length 40 ft. Aluminum Co. of America.

For more information, circle 12-4 on card following page 52.

Stainless-Steel Connectors

Universal PC3 flexible all-metal 321 stainless-steel connectors are designed to alleviate piping stresses due to misalignment, vibration, thermal expansion or contraction in the piping of steam, gasoline, refrigerants, and other fluids to centrifugal pumps and compressors. It provides maximum flexibility in restricted lengths, and is available with silver brazed couplings for w ing pressures from 375 psi for 2½ I 170 psi for 12 in. ID and temperatur to 650 deg F, or welded coupling working pressures from 335 psi for 2½ ID to 150 psi for 12 in. ID for higher t peratures. For low pressure applicat unbraided flexible connectors are avail Universal Metal Hose Co.

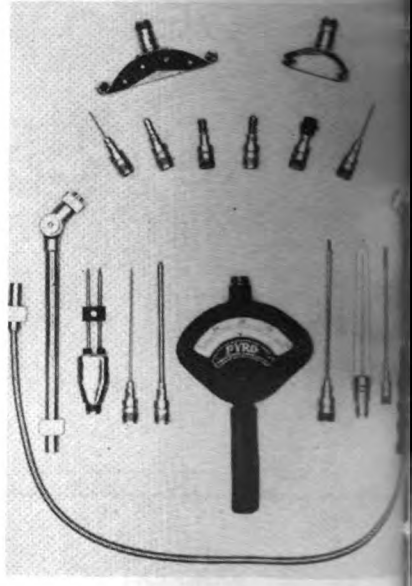
For more information, circle 12-5 on following page 52.



Electrostatic Painting

An airless electrostatic spray painting is said to provide the efficiency of air atomization, plus attraction of paint pa cles by the electrostatic charge. The sy consists of an AP unit with one or m high-pressure paint heaters, a 90,000- power pack, and a special Versa/Elec static spray gun. While voltage is high, rent consumption is said to be less than of a 25-watt bulb. The Nordson Corp.

For more information, circle 12-6 on following page 52.



Pyrometers

The improved Pyro surface pyrometer available in six standard single- and dou range models, with a direct-reading sc up to 4¾ in. It is constructed in a d

(Continued on page 15)

Experience



Over 13 million couplers produced in 67 years

e E Coupler

Service



User service that is both national and international

nal AP Coupler

Development



Through research and testing at its Technical Center, National contributes to coupler advancements

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Unmatched performance for railroads, industrial and mine haulage

n 10-A Coupler

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NATIONAL 3C GLIDING SILL • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM

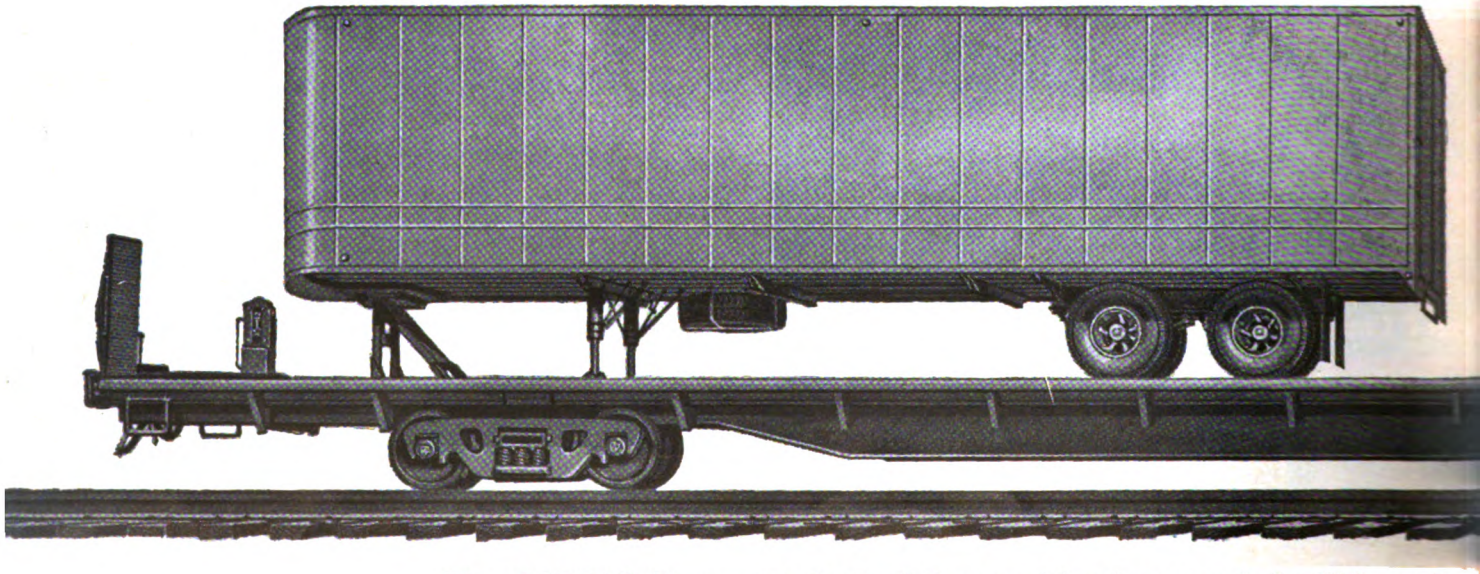
COBRA® SHOE

COBRA Shoes have been on the market for just a little over seven years . . . and already 185 different railroads and private car operators have over 13,000 applications.

Obviously such acceptance must be based on the COBRA Shoes proved performance in service. For example, in high-utilization service, COBRA Shoes have been widely accepted. More than 2,000 piggyback cars are now operating with COBRA Shoes. Here are reasons why COBRA Shoe applications steadily increase.

1. COBRA Shoes last 4 to 5 times longer than cast iron shoes. In commuter service, the resulting monetary savings in many cases are sufficient to *amortize all conversion costs in less than a year.*

2. COBRA Shoe equipped cars have obtained up to twice the *wheel life* of cars using cast iron shoes. It is characteristic of COBRA Shoes that the rate of wheel wear is less and the distribution of wear is such that



The COBRA® Shoe — product of the combined research facilities of...

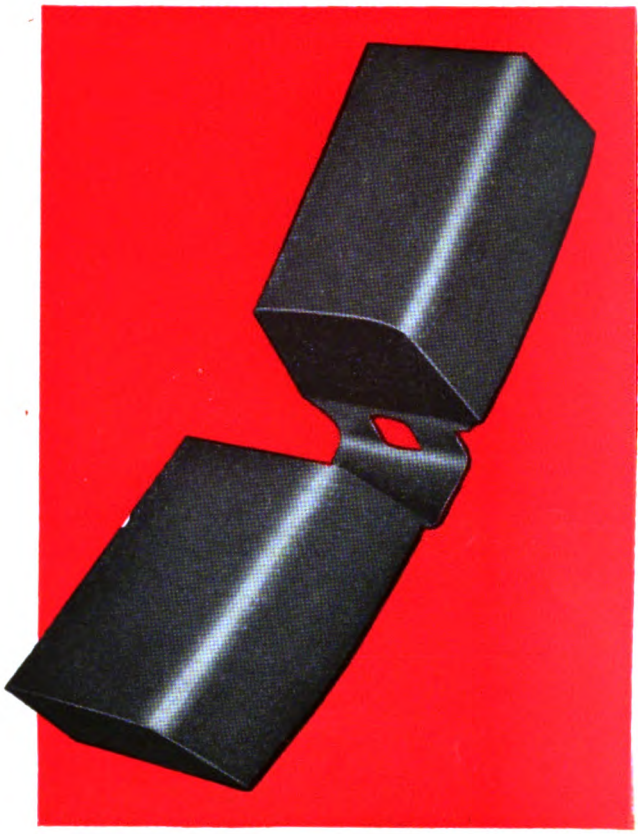
applications steadily increase

the standard flange thickness and thread taper are maintained. In addition, there are fewer wheel renewals for thermal cracks.

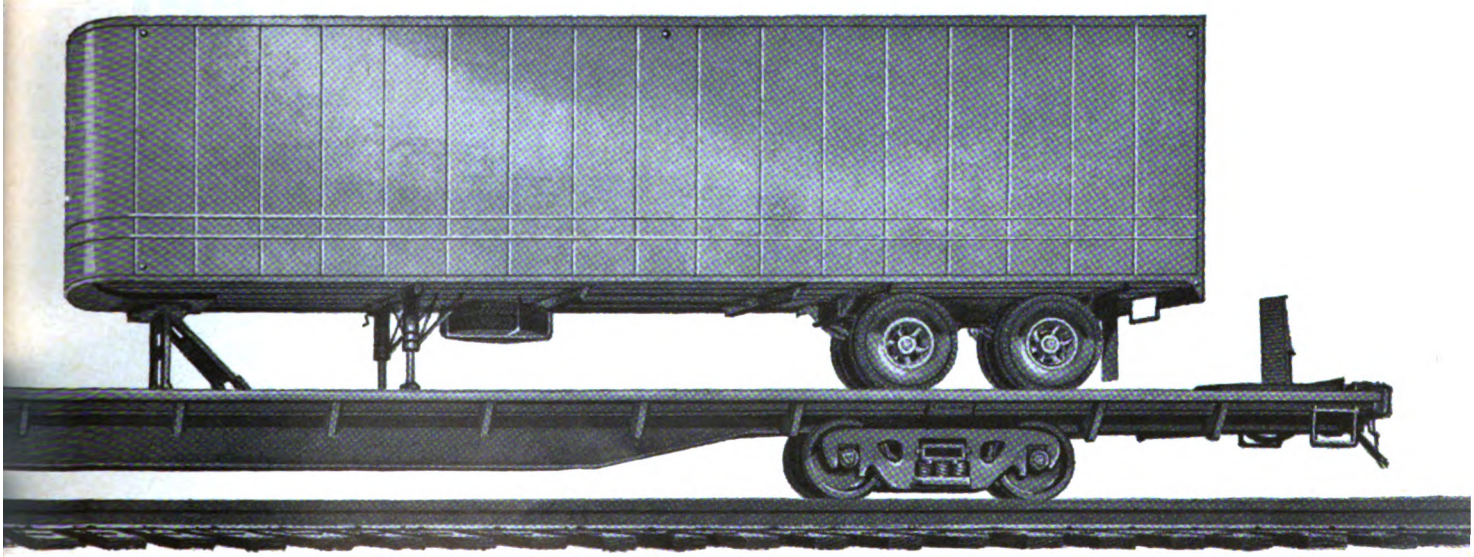
3. The extra smooth and more effective braking characteristic of COBRA Shoes is particularly desirable for piggyback operations to protect against lading damage.

4. COBRA Shoes permit greatly simplified and lighter weight brake rigging. Clasp brakes are not required. This means lower maintenance costs and less downtime.

COBRA Shoes have now proven themselves in *hundreds of millions of miles of operation.* They definitely improve brake performance; they definitely reduce equipment and operating costs. Your nearest Westinghouse Air Brake Division Representative will be discussing COBRA Shoes with you.



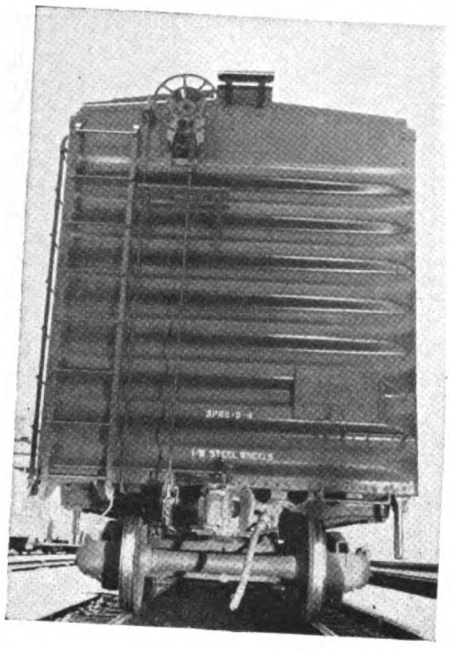
RAILROAD FRICTION PRODUCTS CORPORATION
Wilmerding, Pennsylvania



.... Westinghouse Air Brake Company
Specialists in Braking

..... Johns-Manville Corporation
Specialists in Friction Materials

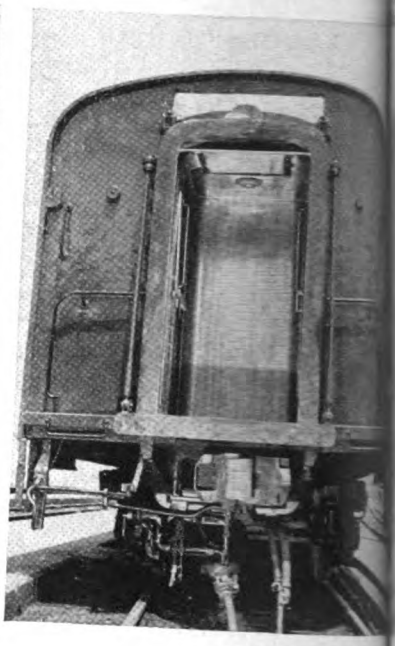
Proved performance for all three...



FREIGHT



DIESEL



PASSENGER

when they roll on Bethlehem wrought-steel wheels

The wrought-steel wheel has measured up to every service requirement for over forty years. Railroads have purchased more than 2½ million Bethlehem wheels for freight cars alone. Many additional thousands of Bethlehem wheels have seen service in passenger and diesel locomotive trucks.

Bethlehem has been a leader in the research and development of wheels that are strong and tough—wheels produced only by forging and rolling. For all three services—diesel, passenger, and freight—Bethlehem furnishes the finest in wrought-steel wheels, both one-wear and multiple-wear, either untreated or heat-treated. We'll be glad to discuss your needs.

Steel

For Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL COMPANY, Bethlehem, Pa. *Export Sales:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

What's New

(Continued from page 10)

oisture, and shock-resistant shielded steel ousing which makes it immune to external nd electrical and magnetic influences. The utomatic internal cold-end junction comensator is said to assure true temperature eadings at all times and under all conditions. Pyrometer Instrument Co.

For more information, circle 12-7 on card ollowing page 52.



Fuel Filter

All contaminants 10 microns and over are said to be removed with the FF-3347-R Spin-on filter. It is spun-on with hand pressure, requiring no tools. By installing the GFB adapter in existing lines, singly or in parallel, the neoprene gasket becomes a permanent fixture. Its enameled drawn-steel shell houses a pleated Porosite filtering element with 955 sq in of filtering surface. The filter, the manufacturer says, is in regular service on a number of railroads. Wix Corp.

For more information, circle 12-8 on card following page 52.



Hand Spray Gun

Metallic, and some nonmetallic, products having recessed areas or intricate patterns can be finished in most types of coatings with the Binks-Ransburg REA electrostatic-air hand spray gun. The unit operates from three-wire, 117-volt, single-phase, 60-cycle current, and power consumption is 50 watts. The gun, which can be operated safely in the presence of solvent vapors, is provided with the voltage supply unit, replacement parts kit, 18 ft of hose for fluids, and 36 ft of hose for air supply. Binks Manufacturing Co.

For more information, circle 12-9 on card following page 52.



Lapping Machine

A molded fiber glass base and a new abrasive distribution system are features of the Model 12 Lapmaster automatic lapping machine. The abrasive distribution system maintains the correct mixture of compound to vehicle from initial filling to last drop, and a constant-pressure pump assures uniform deposit on the lap plate. Spare reservoirs permit quick changeover from one compound to another. The machine handles parts up to 4 3/16 in. in diameter inside each of three conditioning rings—larger parts up to 9 in. when rings are removed. Crane Packing Co.

For more information, circle 12-10 on card following page 52.



Stud Welder

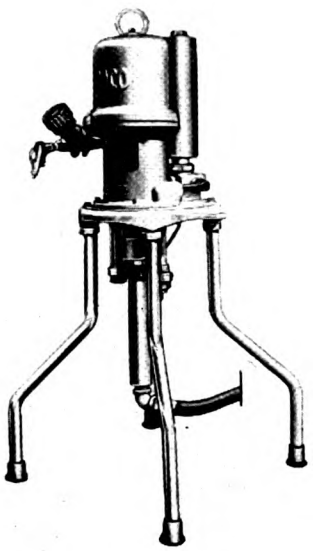
The Stored-Arc stud welding process permits the welding of pins and other fasteners from 1/16 in. through 1/4 in. to light-gauge metals with portable, "plug-in" equipment that operates from any standard 110-120 volt 30 amp, 60 cycle single-phase electrical source. Fasteners can be welded in any position with the trigger-operated gun. The portable 50-lb model welds steel, stainless-steel, and aluminum fasteners from 1/16 in. through 3/16 in. The 150-lb wheel-mounted unit, welds fasteners through 1/4 in. diameters. Gregory Industries, Inc.

For more information, circle 12-11 on card following page 52.

Alkaline Cleaner

Brandet, an alkaline cleaner, solvent-coupled, may be applied by immersion, wipe-on, brush-on, or low-pressure spray methods. It is said to remove light oils, metallic chips, wax and grime from painted, plastic, and fabric surfaces, 1 to 2% being sufficient for light maintenance cleaning; up to 20% for heavy grimy soils. Branson Equipment Co.

For more information, circle 12-12 on card following page 52.



Portable Spray Unit

The Hydra-Rack paint and spraying unit is equipped with a 28:1 ratio Hydra-Spray pump, rated at 1 gpm for handling two or more guns, depending on size of spray tips. The pump is said to be adaptable to almost any type of supply system, gravity or pressure. Gray Co.

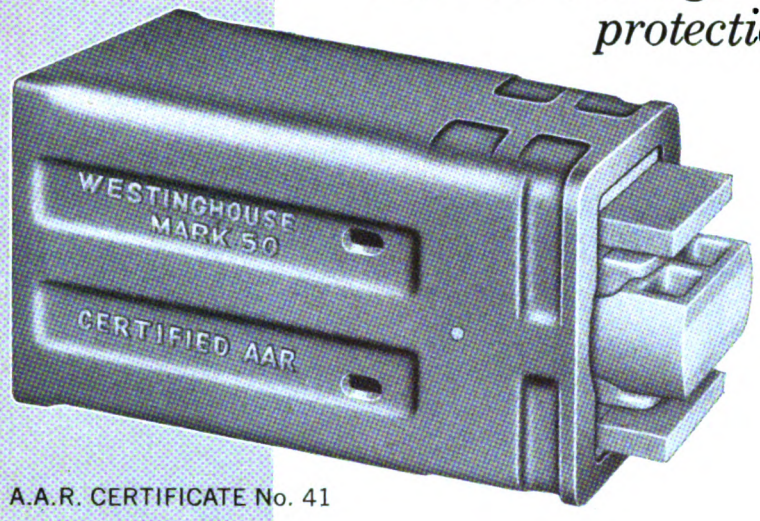
For more information, circle 12-13 on card following page 52.

Welding Wire

Fluxcor 1 wire is designed for semi-automatic and automatic single-pass CO_2 welding of mild steel. Flux compounds in the center of the welding wire augments the CO_2 gas shield by providing ionizers to stabilize the arc and deoxidizers to clean up the weld deposit through the elimination of slag and porosity inclusions. The wire is used with direct current, reverse polarity only. Fluxcor 2 is for multi-pass CO_2 welding of mild steel. Both wires are available in diameters of 5/64 and 3/32 in. Air Reduction Sales Co.

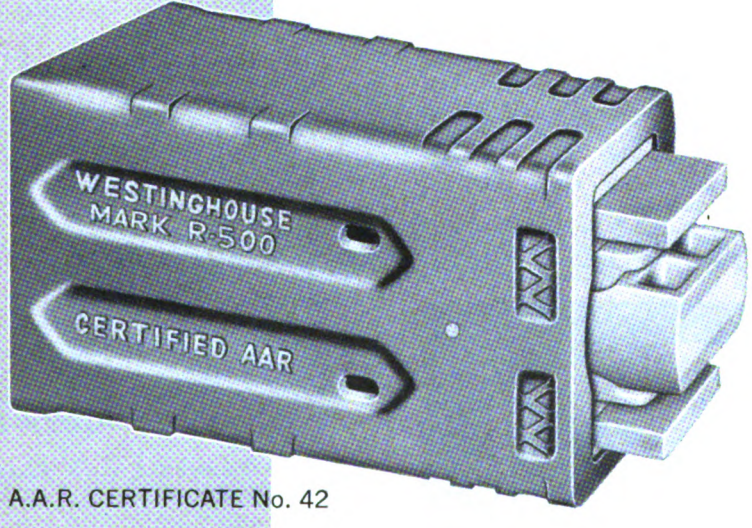
For more information, circle 12-14 on card following page 52.

For real damage-cost-cutting protection behind the coupler



A.A.R. CERTIFICATE No. 41

WESTINGHOUSE
MARK 50
FRICTION DRAFT GEAR



A.A.R. CERTIFICATE No. 42

WESTINGHOUSE
MARK R500
FRICTION-RUBBER DRAFT GEAR

Your choice of these two Westinghouse gears which substantially exceed A.A.R. specification M901E-59!

These two standard 24⅝-inch pocket draft gears were designed to sharply reduce damage claims. MARK 50 is an *all-friction* gear; MARK R500 is combination *friction-rubber*. Use either one with confidence.

Always a Leader in Freight Damage Reduction...

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COMPOSITION TREAD BRAKE SHOES

OUTLAST CAST IRON SHOES



Lower Maintenance Costs

The Anchor Composition Tread Brake Shoe lasts 2½ to 4 times as long as cast iron shoes doing an equivalent braking job. This means lower maintenance costs per train operation mile, and lower replacement costs.

Uniform Friction, Uniform Wear

Braking heat is distributed over the full wheel contact area. Because the wear can be predicted accurately, and because the shoe lasts so much longer, less stocking is required at repair points.

Perfect for Freight Cars

The Anchor Composition Tread Brake Shoe is particularly adaptable to freight car usage, whether for package brakes or conventional installations.

Call your Griffin Sales Representative and discover for yourself how the Anchor Composition Tread Brake Shoe can effect substantial economies in *your* particular operation!

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Editorials

Fact-Finding Cars

So many freight cars are either being built with special equipment or designed to meet specific traffic needs that it is an excellent idea to determine accurately the economic justification for these more costly cars. With this goal in mind the Evans Products Company last month sent five box cars out on a two-year fact-finding mission.

Specifications for the cars were determined by an Evans survey of shippers. They have cushion underframes, load-retaining equipment, adjustable side wall fillers to eliminate voids when palletized loads are shipped and hardwood floors to handle lift trucks. The 50-ft insulated box cars owned by the Evans Equipment Leasing Company have 10-ft staggered plug-type doors and 4,618 cu ft capacity.

Data will be kept over the next two years to record lading, revenue, weight, maintenance and damage. These data are expected to show accurately in comparison with common box cars how much more revenue they can produce, how much heavier they can be loaded, how much less are damage claims, what structural maintenance costs are saved because of cushion underframes and how dunnage costs differ. An Evans engineer will be present every time the cars are loaded and unloaded.

Through this $200,000 project Evans expects to show how cars designed for shippers and equipped to protect both the lading and the car structure make money for the railroads and saves money for the shippers. The data obtained will be most helpful in making a true appraisal of how and how soon cars with special equipment pay for themselves. This search for accurate data is an unusual undertaking for an equipment manufacturer and Evans deserves a lot of credit for initiating the project.

Those Diodes

Every few years the electrical industry comes up with a new material or device that the railroads "latch" upon as the cure to many electrical ills. Silicone was one, epoxy was another, and now semi-conductors are finding favor in railroad electrical circles and circuits.

In general, all such materials or devices have great value if they are used wisely and their limitations are recognized. Semi-conductors are no exception. With this in mind the electrical department of the Illinois Central, headed by R. I. Fort, prepared information for IC personnel to acquaint them with these devices and give them a basic working knowledge of these relatively new components. We believe this information to be of value to all railroad men whose duties require them to deal with the devices and therefore appreciate the opportunity to publish the material with the IC's permission in this (Pg. 41) and subsequent issues.

Semi-conductors include diodes, transistors and silicone rectifiers. The IC material deals with diodes and transisto but it was the silicon or "solid state" rectifier that gave an opportunity to find out a little bit more about the "wh they work" of semi-conductors. When we described th Pennsylvania's first silicon-rectifier electric locomotiv (RL&C, September, 1962, p 38) we asked General Elec tric if it would give us an explanation of how the rectifie works in language that could be understood by folks lik ourselves who are not versed in the mysteries of electron The explanation may be helpful to others and is wort repeating.

It seems that the silicon rectifier is a junction-type semi conductor. The rectifying action (changing alternating t direct current) takes place in the interior of a crystal o some semi-conductor substance such as silicon or ger manium. Rectification occurs in the junction zone of tw types of impurities diffused into the crystal from opposite sides. An "N" type impurity introduces an excess of elec trons on one side of the junction. An "P" type impurity causes a deficiency of electrons, or "holes," on the other side. Electrons flow easily across the junction when a low voltage is applied in one direction (forward polarity). Voltage in the opposite direction (reverse polarity) drives the electrons and "holes" away from the junction, leaving an electron "desert" and consequently the current flow is extremely small even when high reverse voltages are applied.

We are not sure that we have a clear picture of what semi-conductors do but we get the idea they can be made to act as a one-way street, letting electron traffic flow in one direction, and throwing up an effective barricade to traffic in the reverse direction.

We are sure, however, that more railroad uses will be found for semi-conductors as rectifiers, switches, resistors and in other applications. It is important that we learn both how to use them and how they can be misused.

New Billing Procedures

We read recently that the cost of paper work involved in moving a freight car across the country is more than the cost of moving the car itself. We have not verified the accuracy of this statement but we are sure that the costs are high. This is why the AAR Mechanical Division has revised the Interchange Rules and adopted new procedures to simplify the paper work and permit machine accounting of interline car-repair billing.

The new procedures, described in this issue starting on Page 29, are not mandatory and their introduction will undoubtedly be gradual. They will be most helpful now to those roads with a large investment in computers or data processing machines that are not being used to capacity but it is expected that the majority of the large roads will adopt the new system within a few years.

There is always a big job to do in educating personnel in new procedures, particularly when they involve both office and field forces. We believe that all car department men should study and familiarize themselves with the new car-repair billing system even though their respective railroads do not immediately make use of machine accounting methods. The new procedures are sure to become the standard of most railroads.



UNION PACIFIC

A NATIONAL BRUSH USER FOR 25 YEARS

The Union Pacific's 10,000-mile system covers a vast region of great productivity and spectacular scenery.

Operating under varying conditions of desert heat, low humidity, and Rocky Mountain grades, Union Pacific's traction motors and main generators use "National" brushes for reliable commutation with minimum commutator maintenance.

From its initial use of "National" brushes over 25 years ago, the system now has them on many of its diesels... to provide power for speedy Domeliners and 100-car freight trains... to assure maximum performance hour after hour.

The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes.

This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. *In Canada:* Union Carbide Canada Limited, Toronto.



Contact Mr. National Carbon

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NATIONAL CARBON COMPANY

AMERICA'S FIRST 100% DIESELIZED SYSTEM...



GULF, MOBILE & OHIO

DEPENDS 100% ON NATIONAL BRUSHES
TRADE MARK

When the GM&O purchased their first diesel electric locomotive units 27 years ago, they began using "National" brushes. By 1949, the system was completely dieselized, with these brushes on over half the equipment. Because of proven maintenance savings and reliability, "National" brushes are now used on *all* road power traction motors and main generators.

Today, the GM&O operates over 250 diesels on its important link between the Great Lakes and the Gulf. Providing this efficient motive power fleet with dependable commutation and minimum commutator maintenance the year 'round is the vital job of "National" brushes.

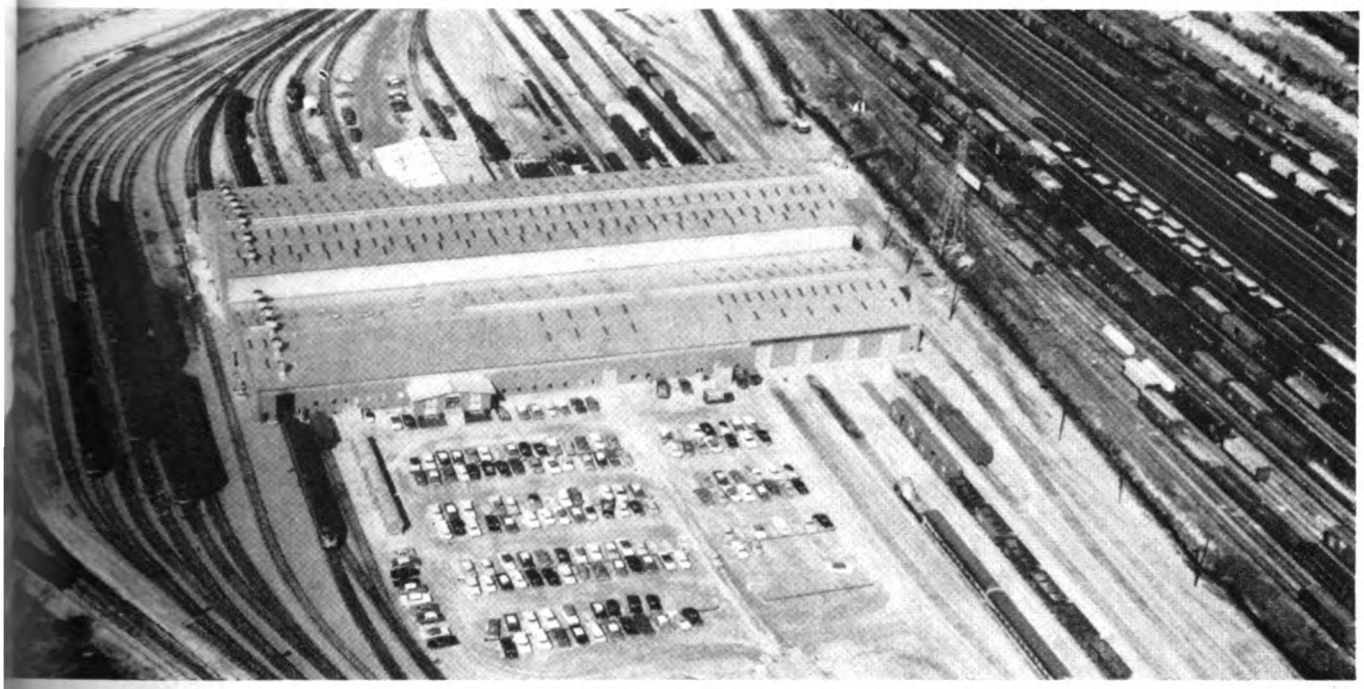
The unsurpassed quality and reliability of "National" carbon brushes—combined with a complete service program—meets every test of Value Analysis for railroad brushes. This program is available by calling your "National" brush man, or by writing to National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. *In Canada:* Union Carbide Canada Limited, Toronto.



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our-acre shop structure is located at west side of Acca Yard (right). Locomotives are stored on ready tracks (left) after servicing is completed.

Cars, Diesels Repaired in One Shop

Consolidation of RF&P locomotive, freight and passenger car maintenance is yielding savings

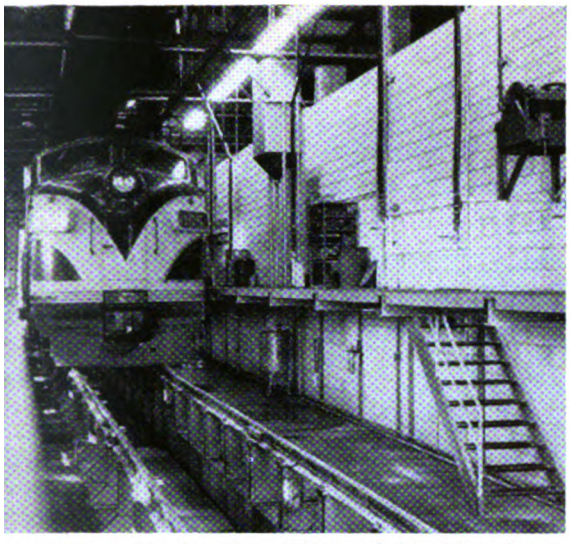
What should a mechanical department do when given the opportunity to design completely new facilities for heavy and running repairs to cars and locomotives? When presented with this problem involving its operations at Richmond, Va., the Richmond, Fredericksburg & Potomac came up with this answer: Consolidate them. The resulting shop facility, recently opened at Bryan Park in Richmond, is already making possible savings in RF&P equipment-maintenance operations, according to H. T. Rainey, Jr., chief mechanical officer.

The RF&P, important 113-mile, double-track link between Washington, D.C., and Richmond, handles freight traffic between Potomac Yard at Alexandria, Va., and the roads converging on Richmond from the South. The area served by the RF&P itself is of growing industrial importance. In addition to its heavy through freight traffic, interchanged primarily with the Atlantic Coast Line and Seaboard at Richmond and with the Baltimore & Ohio and Pennsylvania at Potomac Yard, the RF&P also functions as a link in the heavy passenger service between northeastern cities and the Southeast. Participation in through passenger services involving the PRR, ACL and SAL requires that the RF&P own and maintain a large number of passenger-train cars.

Because of its heavy traffic, both freight and passenger, the road has a relatively large motive-power inventory. The short length of its main line makes rapid turn-around important in achieving satisfactory road locomotive utilization. Normally, most locomotive servicing is done at Richmond rather than at the northern terminals, Potomac Yard for freight, and Washington for passenger. In addition, the RF&P services and inspects all Atlantic Coast Line road locomotives which terminate their northbound runs in the RF&P's Acca freight yard, or at Richmond Union Terminal. During the winter season there is a regular upturn both in passenger and freight traffic, with a significant increase in the number of train movements. Normal off-season schedules call for ten freight and 21 passenger train movements over the RF&P daily. Regular ACL operations involve about ten freight and ten passenger trains daily.

RF&P equipment inventory includes:

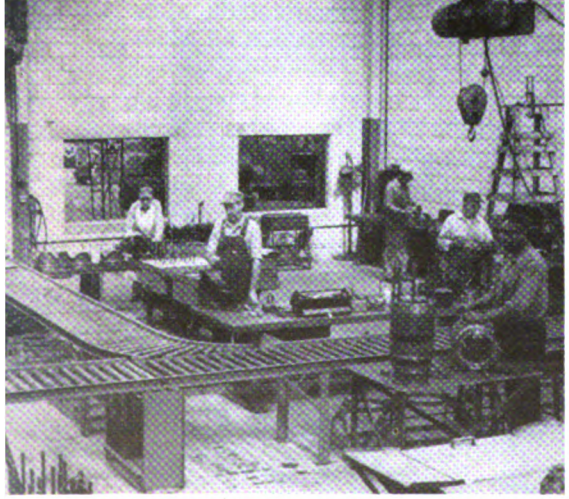
- *69 locomotives*—20 2,250-hp GM road passenger units, 21 1,500-hp GM road freight units, 4 1,500-hp GM



Run-through servicing track has lube oil reels mounted on side walls. Sand delivery equipment is mounted on lower level; hoses are overhead.



Automatic fueling equipment is important for indoor servicing. Locomotive is also inspected during its single stop in the new shop.



Reclamation shop where diesel engine components are processed is connected by conveyor with adjacent cleaning area. It opens on main bay. Electrical shop is adjacent.

general purpose units, 3 1,500-hp GM freight-passenger units, and 21 1,000-hp Alco switchers;

- *101 passenger cars*—23 lightweight coaches, 28 standard coaches, 5 standard sleepers, 2 diners, 40 head-end cars, and 3 other cars;
- *315 freight cars*—141 box, 88 gondola, 88 hopper, and 4 covered hopper.

All ACL road locomotives which come to Bryan Park for servicing and inspection are General Motors units of various types.

The consolidated shop is the result of a study undertaken in 1960 by a committee of mechanical and engineering department officers. The former Acca locomotive terminal and shops which had been used since 1923 for RF&P's equipment maintenance operations at Richmond were scattered over a tract with great potential for industrial development. While savings in maintenance of equipment costs were estimated to produce an attractive return, the industrial development possibilities gave further impetus. The $1.8 million project was authorized by the RF&P board in November 1960 and construction started soon thereafter. RF&P engineering and mechanical forces did much of the work on the new facility.

Prefabricated Building

The Armco prefabricated aluminized-steel building which houses the new shop was erected by the manufacturer. About four acres of floor space are under roof. Along with all equipment maintenance operations, RF&P purchasing and stores facilities have also been moved into this structure. The building is divided into three main areas—one for servicing and repair of diesel locomotives, one for repair and maintenance of passenger and freight cars, and the third for storage and distribution of materials. It also contains all mechanical, purchasing and stores offices. The building, located just west of the RF&P north-south main line at Acca Yard, has ten tracks entering it. Five of these are through tracks—four for car repairs and one for locomotive inspection and servicing. Four stub-end tracks entering the shop from the north side are used for locomotive repairs. An additional stub-track extends into the machine shop area from the north.

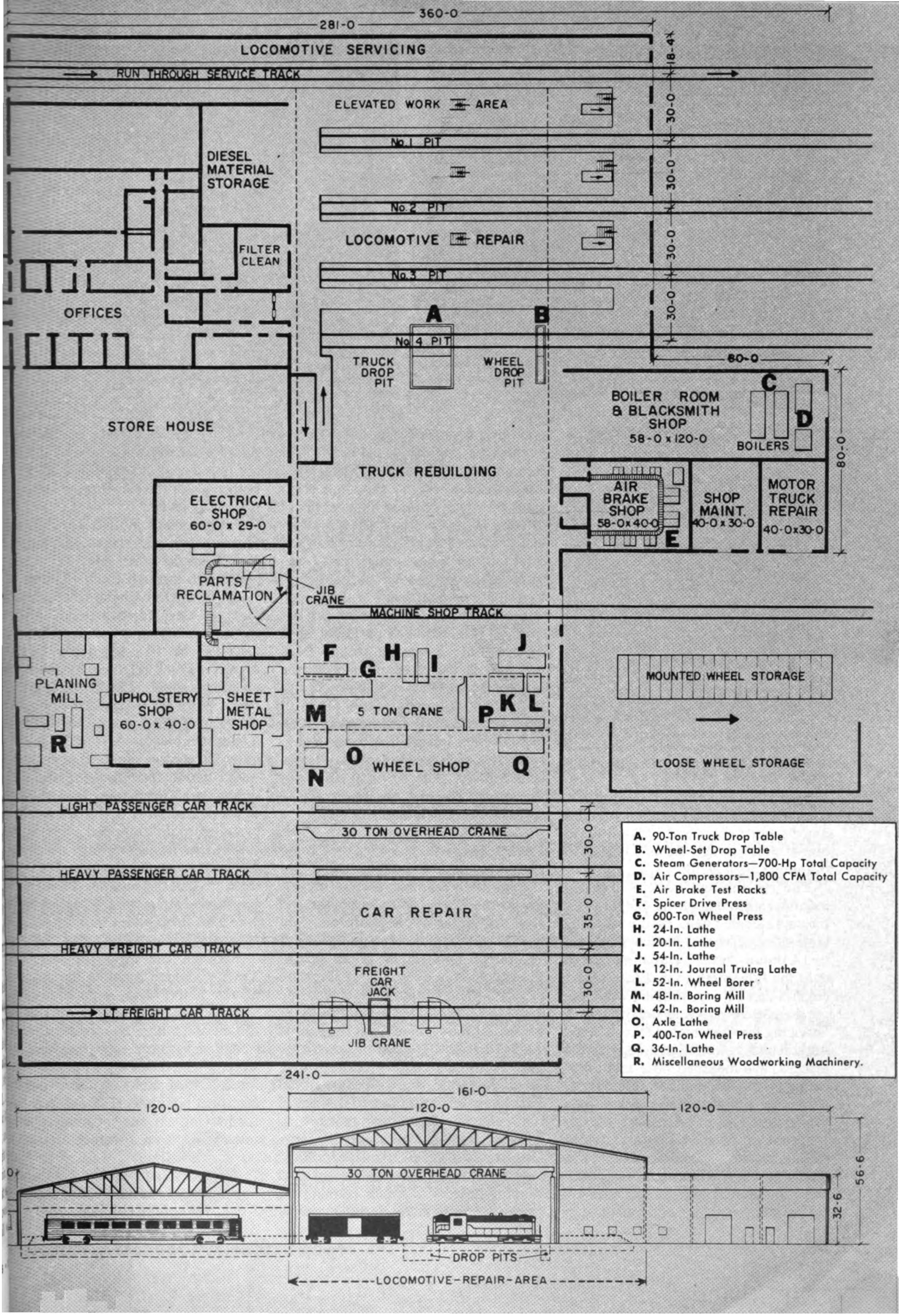
The main bay, 465 x 120 ft and 160 ft, has a clear height of 40 ft and is equipped with a 120-ft traveling crane. To the south and parallel to this is another 465-ft x 120-ft bay with a clear height of 20 ft. It is this bay which contains all the offices, the storehouse and several of the specialized work areas. Extending from the north side of the main bay is a 120-ft x 80-ft wing containing additional work areas and the shop heating plant.

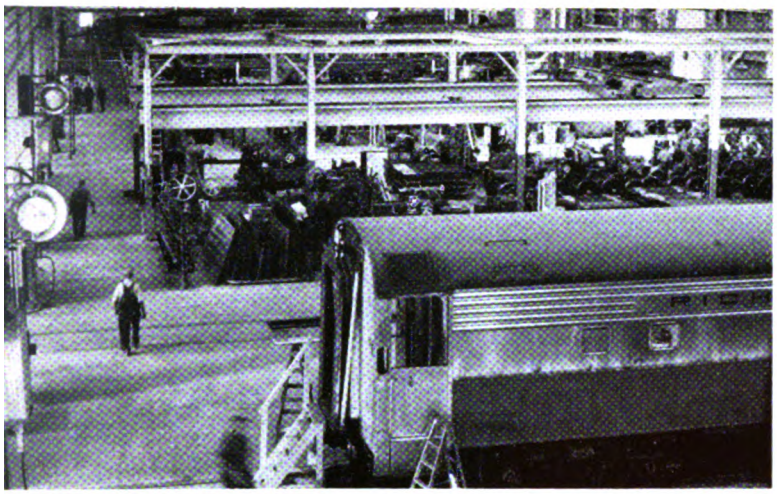
The building is single-sheathed and uninsulated except for the south face and the office and storehouse areas. There are skylights in the roof over all areas except the office and stores sections. In addition, high-bay fluorescent lighting is installed in all shop areas to provide a 50 ft candle illumination level. All shop areas are heated using fan-driven ceiling mounted steam heaters. All offices are air conditioned.

Normally, all locomotives enter and leave the shop over a double-track lead extending from the shop to the south end of Acca Yard. There is also a lead from the north and a nine-track locomotive storage yard at the west side of the building in which units are placed after being inspected and serviced. A track diverging from the inbound lead serves the car repair facilities. In addition to the four car repair tracks extending through the shop, there is another track which passes outside the east end of the building, designated as a load-adjustment track. Cars are moved northward over these five tracks after being delivered to the shop by switching locomotives. They are picked up at the north side of the building for return to Acca Yard or to the Richmond passenger station.

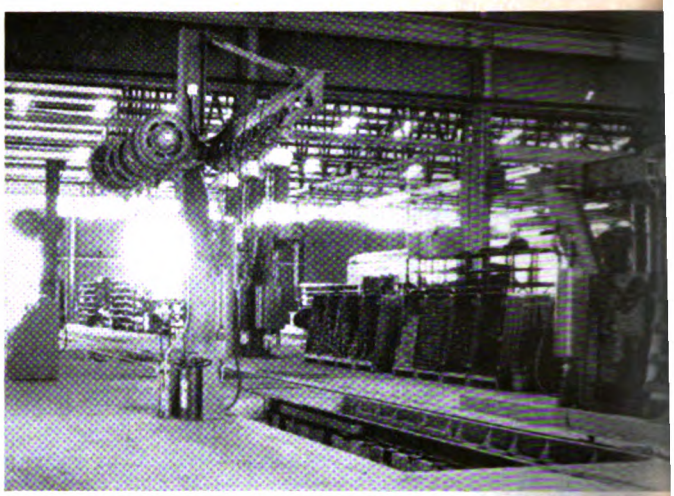
Trip servicing, inspection and repair of locomotives is performed on the 280-ft run-through track adjacent to the west wall of the shop. Designed for working 200 units per day, normal daily load ranges from 95 to 140 units. This includes all types of RF&P units and the road-freight and road-passenger power of the ACL.

Locomotives are delivered to the servicing location inside the shop on the run-through track by road crews as they tie up at the ends of their runs. Locomotive consists of up to six units are handled routinely. All locomotives, both RF&P and ACL, enter the run-through track from the south. Normal servicing, inspection, and repair cycle for a four-unit freight locomotive is approximately 30 min. All facilities are arranged so that the locomotive need not be again moved after spotting in the shop until all work has been

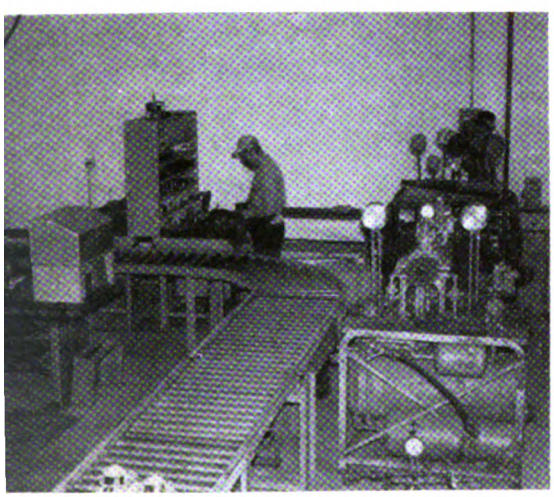

360-0
281-0
LOCOMOTIVE SERVICING
RUN THROUGH SERVICE TRACK
18-4
30-0
30-0
30-0
30-0
ELEVATED WORK AREA
No. 1 PIT
No. 2 PIT
No. 3 PIT
No. 4 PIT
LOCOMOTIVE REPAIR
DIESEL MATERIAL STORAGE
FILTER CLEAN
OFFICES
STORE HOUSE
A
B
TRUCK DROP PIT
WHEEL DROP PIT
60-0
BOILER ROOM & BLACKSMITH SHOP
58-0 x 120-0
C
D
BOILERS
80-0
TRUCK REBUILDING
ELECTRICAL SHOP
60-0 x 29-0
AIR BRAKE SHOP
58-0 x 40-0
E
SHOP MAINT.
40-0 x 30-0
MOTOR TRUCK REPAIR
40-0 x 30-0
PARTS RECLAMATION
JIB CRANE
MACHINE SHOP TRACK
PLANING MILL
R
UPHOLSTERY SHOP
60-0 x 40-0
SHEET METAL SHOP
F
G
H
I
J
M
5 TON CRANE
P
K
L
N
O
WHEEL SHOP
Q
MOUNTED WHEEL STORAGE
LOOSE WHEEL STORAGE
LIGHT PASSENGER CAR TRACK
30 TON OVERHEAD CRANE
30-0
HEAVY PASSENGER CAR TRACK
CAR REPAIR
35-0
HEAVY FREIGHT CAR TRACK
FREIGHT CAR JACK
30-0
LT. FREIGHT CAR TRACK
JIB CRANE
241-0
161-0
120-0
120-0
120-0
30 TON OVERHEAD CRANE
56-6
32-6
DROP PITS
LOCOMOTIVE-REPAIR-AREA
A. 90-Ton Truck Drop Table
B. Wheel-Set Drop Table
C. Steam Generators—700-Hp Total Capacity
D. Air Compressors—1,800 CFM Total Capacity
E. Air Brake Test Racks
F. Spicer Drive Press
G. 600-Ton Wheel Press
H. 24-In. Lathe
I. 20-In. Lathe
J. 54-In. Lathe
K. 12-In. Journal Truing Lathe
L. 52-In. Wheel Borer
M. 48-In. Boring Mill
N. 42-In. Boring Mill
O. Axle Lathe
P. 400-Ton Wheel Press
Q. 36-In. Lathe
R. Miscellaneous Woodworking Machinery.



Coach repairs are made on two tracks next to wheel-shop area. Near these tracks are upholstery, sheet-metal, and woodworking areas. Wheel-shop equipment is serviced by small traveling crane. Fluorescent lamps produce 50 foot-candle illumination at working areas.



Spot freight-car repair operations are controlled from console (left). Pits outside tracks at two jib cranes permit truck work without bending. Materials are stored in pallets and racks awaiting use. Tools all have places on convenient tool boards.



Air-brake shop is centered around U-shaped roller conveyor on which components are moved to cleaning benches (rear) and then to the series of test racks (right).

completed. A hostler then moves it on out the north door and backs it on to one of nine storage tracks adjacent to the shop's west wall.

The run-through track is pedestal mounted throughout its length with pits and elevated work platforms along both sides. Exhaust hoods connected to 14 motor-driven ventilators extend over the full length so that locomotive engines can be kept running while being inspected, serviced and repaired. Servicing facilities include six metered fuel-oil outlets with Buckeye automatic nozzles, five mounted hose-reel lubricating oil outlets, eight mounted hose-reel outlets for water, and 50 sand-box filling hose drops. All these are arranged for servicing up to six units simultaneously. Sanding hoses can reach all the diverse sand-box locations on different styles of locomotives.

The Impco sanding equipment, supplied by Imagineered Products Co., is of the type first put in service on the Reading (RL&C, January 1962, p 40). At both ends of the shop are short spurs on which covered hopper cars of dried sand are spotted. The pneumatically powered Impco equipment draws sand through a hose coupled to a special opening on the sand-car hopper into a filling compartment of the Impco unit mounted on the lower level of the shop. From this compartment it is dropped into a storage section from which it is delivered directly to the sanding hoses overhead. Operation is completely automatic, with filling of storage tanks occurring as sand is delivered into locomotive sand boxes. Normally, eight tons of sand are consumed daily. The RF&P has four of the special covered hoppers assigned for sand movement and storage.

Fuel Storage

Fuel-oil hoses and meters are on the lower work level; lubricating oil reels are on the upper platforms. Engine lubricating oil is stored in three 17,000-gal tanks at the south side of the shop. It is delivered in the shop by a 250-gpm pump. Fuel is taken from a pair of 200,000-gal storage tanks located in the former Acca shop area. Industrial development of this area may eventually require relocation of these fuel tanks. Normally, Bryan Park shop delivers about 40,000 gal of fuel daily into locomotive tanks.

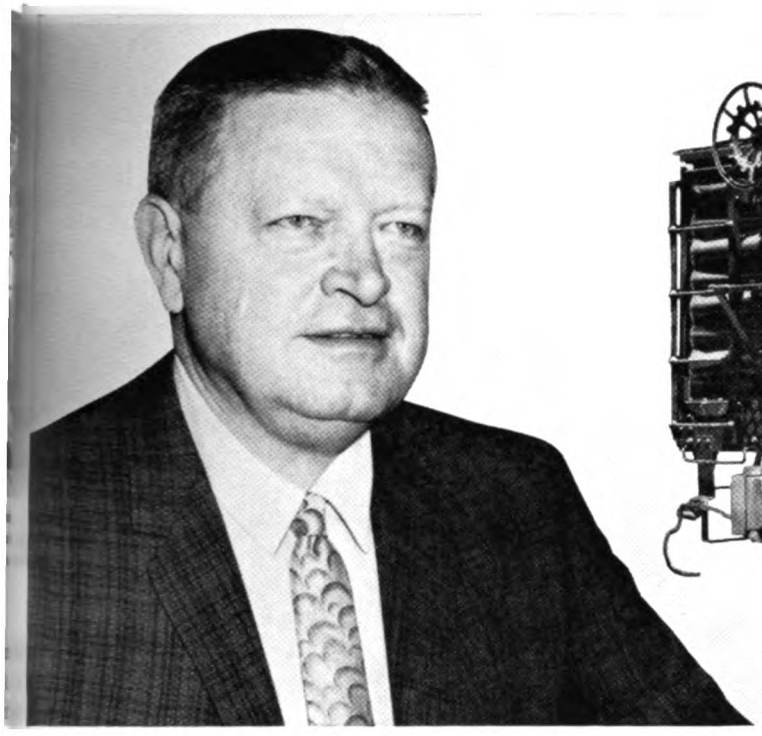
While the locomotive is being serviced, it is also receiving inspections of engineroom, electrical equipment, and running gear, with minor running repairs also being made during the servicing cycle. Materials required for running repairs, such as brake shoes, are stored on pallets and shelving along both sides of the run-through track on both work levels.

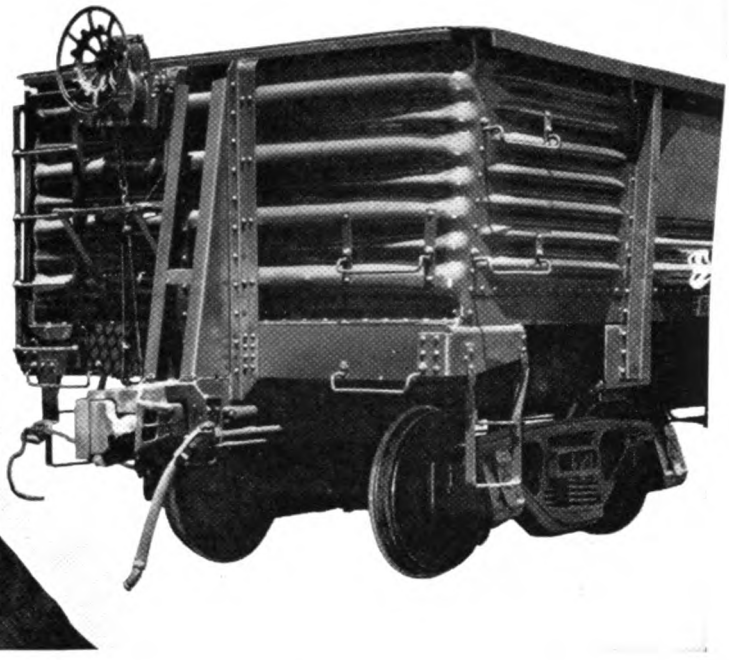
All other locomotive work is done on four stub-end tracks entering the shop from the north side. To the east of the run-through track (Track 11) are three tracks with the same arrangement of elevated, depressed, and pit work areas which are utilized for ICC tests (Track 10), for heavy running repairs (Track 9), and for complete engine overhaul (Track 8). Tools and repair parts for specialized operations on each of these tracks are stored in adjacent cabinets. A 54- x 39-ft diesel material storage area, convenient to both running and heavy repairs, is operated on an open-stock basis. Beside this stock room is a 19- x 23-ft filter cleaning room equipped with a Paxton-Mitchell washing and oiling machine. East of the elevated work platform is Track 7 equipped with a 90-ton truck drop pit and a smaller single-wheel-set drop pit for individual wheel sets and traction motors.

Between the drop pit track and Track 6, which is at the approximate center of the shop, is an area where trucks, both locomotive and car, are rebuilt and where traction motors and steam generators are repaired and stored. The RF&P uses unit exchange for major repairs of heavy rotating electrical equipment. Track 6 is used for moving car and locomotive wheel sets to and from a storage area to the north of the shop.

An 80- x 120-ft bay extending northward from the main shop be-

(Continued on page 46)





Trouble Shooter ..Quality Guardian ..and Cribbage Ace

Harold G. Murphy is Product Service Manager of Standard Railway Equipment Division of Stanray Corporation.

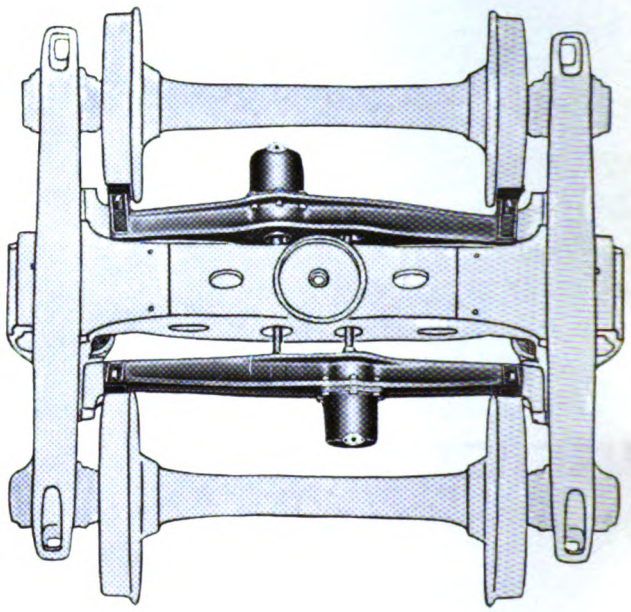
Twenty-five years of service with Standard have made "Murph" about as knowledgeable as a man can get about our products.

That's why Standard customers are glad to know that "Murph" keeps his hat handy, ready to go anywhere a problem comes up. Actually he carries Standard quality control into the field by making sure that our products are doing the job they were sold to do.

"Murph" counsels railroads and car builders about how Standard products can serve them best, recommends designs that fit the builder's need. In short, Harold Murphy makes sure Standard service lives up to everything you expect of it.

STANDARD RAILWAY EQUIPMENT
division of STANRAY CORPORATION
Hammond, Indiana • New York • Chicago

The progressive Western Maryland specifies WABCOPAC® brake units on new box cars





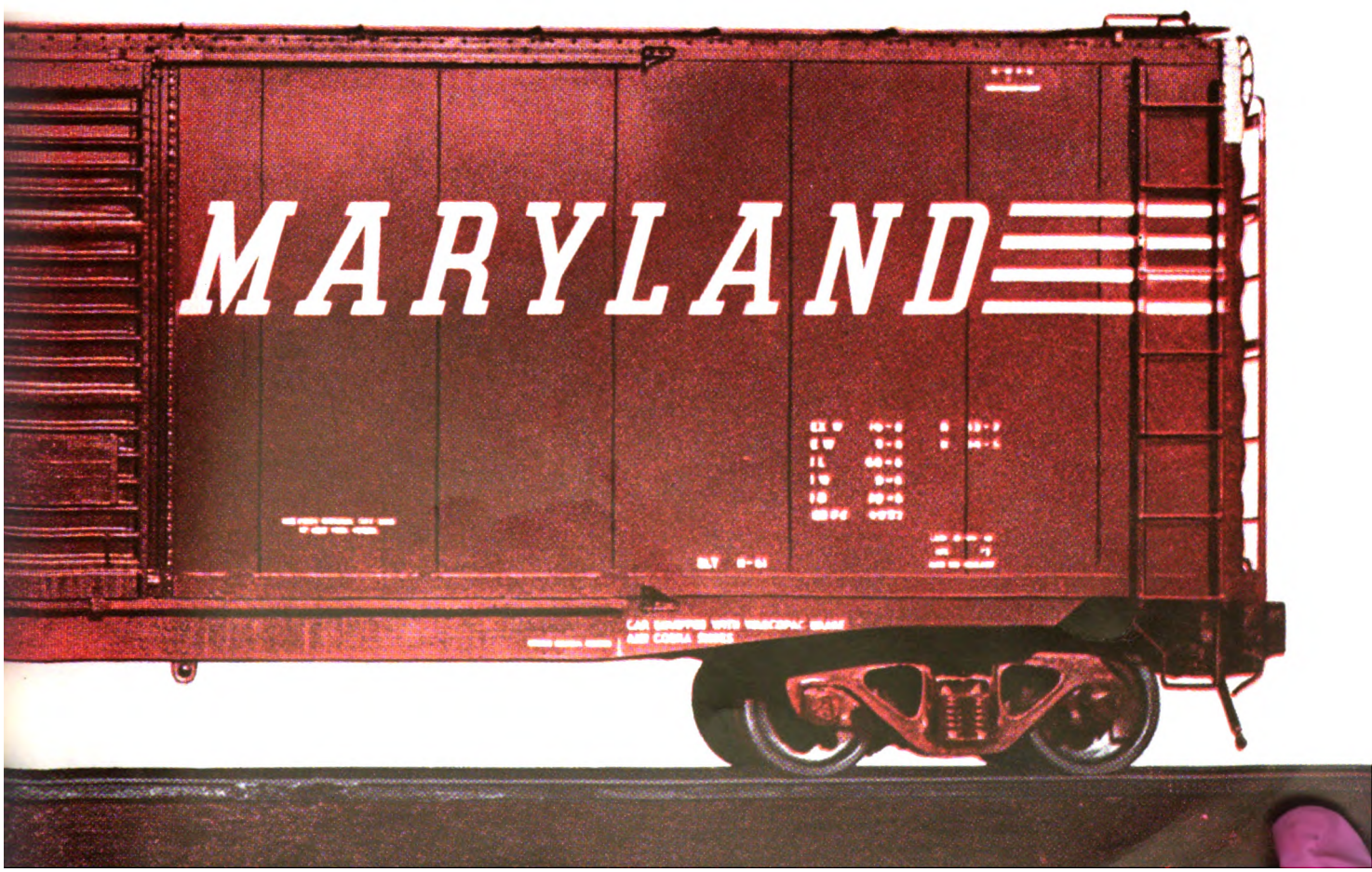
A good example of progressive thinking that prevails on the Western Maryland, is illustrated by their decision to specify WABCOPAC® Brake Units on a recent fleet of new box cars. Replacing a system of complicated beams, levers and rods running along the underside of the car, the Western Maryland utilizes WABCOPAC Brake Units that compact foundation brake parts into easily assembled truck components. Each truck assembly consists of two identical WABCOPAC Brake Units, each with a cylinder, joined by push rods and equipped with COBRA* Composition Brake Shoes.

WABCOPAC Brake Units make it possible to lower car profiles and weights, and reduce brake rigging maintenance. Lower profiles permit greater overhead clearance for extra capacity cars.

*Registered trademark of Railroad Friction Products Corporation

WABCO

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To passengers, a window is to *look out of*. To men who build structures or vehicles, a window is one thing to *look out for*. Experience has taught them to look beyond price and specifications alone. Does the manufacturer have "know-how" in *all* types of windows? Is it an old, established company? Does this company design, extrude, fabricate and anodize aluminum sash under its own roof?

THESE THREE QUESTIONS DETERMINE RESPONSIBILITY

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Car Repair Billing on Punch Cards

AAR member roads have authorized use of new types of car repair reports and bills which may soon be in use

Adoption of new procedures for interline car-repair billing can mean that many car department men will soon be working with new billing repair cards. And "cards" they will be because the new forms are the punch cards which will make it possible to do interline billing on data processing machines.

Actually, the billing repair forms, prepared under the direction of the AAR Mechanical and Accounting Divisions, will consist of an original on paper stock and a second copy on punch card stock bound together with a carbon. The original, or record, copy will, as at present, be retained by the repair point, while the carbon copy on the card will not only carry the information for the railroad's AAR billing office, but will actually be the punch card used in the machine accounting.

Although machine accounting is not mandatory under the revised Interchange Rules, the adoption of the punch card forms as an alternate standard represents one of the final steps in a program begun five years ago. Revision of the Interchange Rules has included simplification and standardization of requirements and materials, elimination of obsolete sections, and assignment of code numbers to individual repair operations and materials—the so-called "Item Code" of Rule 101. Each of the successive changes has brought closer the possibility of utilizing the elaborate accounting machines now available on most major railroads.

The new billing repair cards are, according to the latest Interchange Rules revision, "to be completed by field forces in connection with transportation yard, shop, or repair track repairs." Introduction of these forms will probably be gradual with greatest impetus for their use coming from roads now ready to go to fully mechanized car repair billing.

Potentially, the change to full machine accounting can mean millions of dollars in savings, according to an AAR Mechanical Division spokesman. The idea of using this system started about two years ago when the AAR Accounting Division suggested that idle time on computers might be utilized for car repair billing. The Accounting Division appointed a subcommittee under the chairmanship of L. E. Johnson, director of machine procedures, Illinois Central, to work out details.

Present indications are that the IC may be the first to adopt the new system. Already the road has research and programming crews working on the problems involved. Preliminary flow charts have already been completed. The accounting will be done on an IBM 7080 computer. Many other roads are showing interest in the new system, and it has been predicted by one AAR spokesman that most major roads will be using the new system within two years.

Interchange Rules

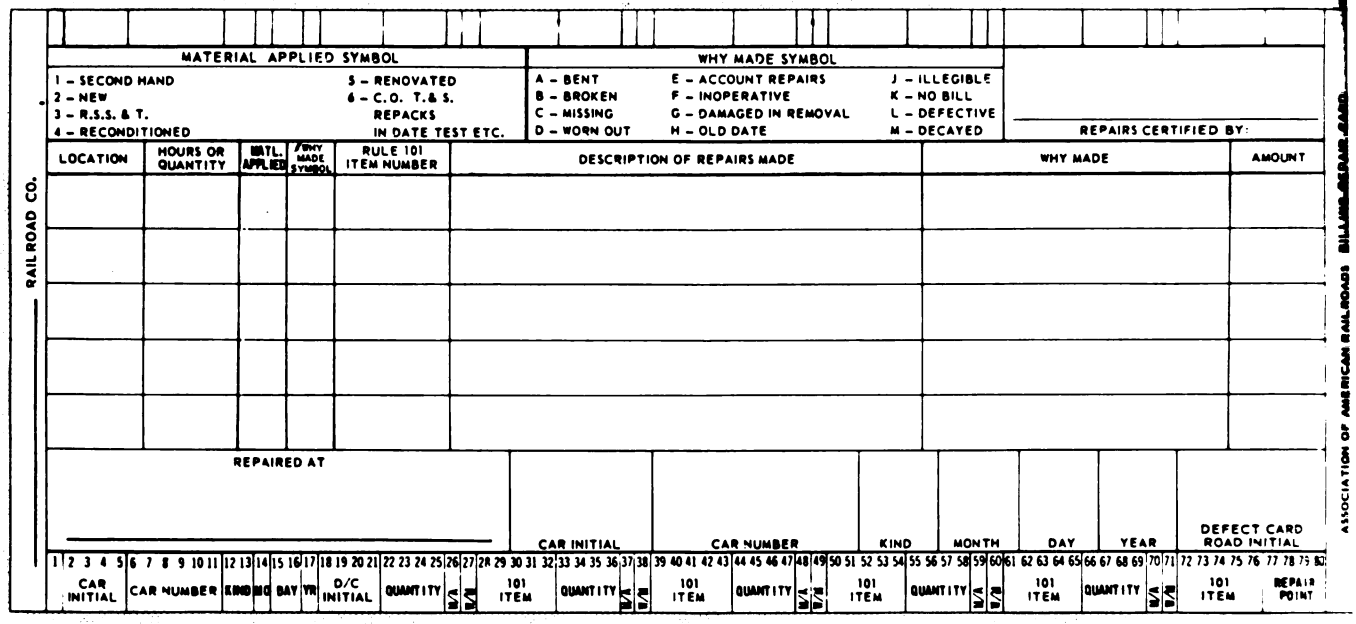
Modifications and deletions in Interchange Rules 91, 92, 93, 94, 96 and 100 concerning this subject were recommended by the Mechanical Division's Arbitration Committee and approved at the 1962 annual meeting in June. These changes have been included in the latest supplement to the 1962 Code. Rules 92, 93, 96, 98 (including Interpretation 1), and 100 have been eliminated completely. Instructions included in these rules, where pertinent, are now part of revised Rule 91. A new Rule 92 provides for the alternate method of machine billing, using preprinted and prepunched billing repair cards. The forms involved are:

- Form A—Billing Repair Card for recording and keypunching five items of repair;
- Form B—Billing Repair Card for change of one pair of wheels and an axle when it is desired to price manually;
- Form B-1—Billing Repair Card for change of one pair of wheels and an axle when it is desired to do pricing automatically;
- Form C—Working Card used only for accounting machine purposes, with areas designated to receive data from Form A, B, or B-1 cards.

No deviation from the key punch columns is permissible on any of these cards. On Cards A, B and B-1, use of the item code in Rule 101 is mandatory.

Card A provides for the recording and keypunching of five items of repair. It is to be completed for repairs other than wheel-and-axle changes. Information, other than signatures, including descriptions of standard repair operations, may be printed and punched in advance, leaving data such as car number and location on car for completion in the field. Prior to keypunching, the cards must show the correct symbols and item codes. In completing the card there are 15 items of information which must be properly handled:

- Repair certification. Signature on the card must be that of the person authorized to vouch for the correctness of repairs in accordance with Rule 7.
- Location. When required, location of repairs on car must be specified as required by Rule 14.
- Hours or quantity. Quantity of each item-code number used in making repairs must be recorded. When reporting hours not otherwise covered by Interchange Rules, show actual time. This data is keypunched in columns 22 to 25, 33 to 36, 44 to 47, 55 to 58, or 66 to 69.
- Material applied. Symbol number preprinted on the card is used. These are: 1—Second Hand; 2—New; 3—RSS&T; 4—Reconditioned; 5—Renovated; 6—COT&S repacks, in date test, etc. Keypunch in columns 26, 37, 48, 59, or 70.
- "Why Made" symbol. Cause of repair must be indicated with the appropriate symbol preprinted on the card. These are: A—Bent; B—Broken; C—Missing; D—Worn Out; E—Account Repairs; F—Inoperative; G—Damaged in Removal; H—Old Date; J—Illegible; K—No Bill; L—Defective; M—Decayed. Keypunch in columns 27, 38, 49, 60, or 71.
- Item number. In recording the re-



CARD A-BILLING REPAIR CARD

pair items, a maximum of five to each card, use the item code number shown in Rule 101. If this rule is not applicable, use number "105" in lieu of the code number. Keypunch the code numbers or 105 in columns 28 to 32, 39 to 43, 50 to 54, 61 to 65, 72 to 76.

- Description of repairs. Describe the item of repair as required by Interchange Rules.
- Why Made. Show reason for making repair and information pertaining to material removed as required by Interchange Rules, indicating Rule 32 condition if involved.
- Amount. In the mechanized system for use of billing personnel, where Interchange Rule 105 applies, or for pricing on a manual basis.
- Repairing station. Indicate station name in "Repaired at" space. The station code number may be stated if desired and keypunched in columns 77 to 80.
- Car Initial. Show standard reporting marks stenciled on car which are then keypunched in columns 2 to 5.
- Car Number. Show car number which is keypunched in 6 to 11.
- Kind. Where required, the following symbols must be used in reporting type of car: Box—B; hopper—H; covered hopper—CH; gondola—G; flat—F; stock—S; refrigerator—R; tank—T; all others—specify. Keypunching of this information is in columns 12 and 13.
- Date of repairs. Date repairs are completed should be shown for keypunching in columns 14 to 17.
- Defect card. Show standard reporting marks, or name if there are no assigned reporting marks, of organization responsible when repairs are made on authority of defect card. Keypunch in columns 18 to 21.

Wheel Cards

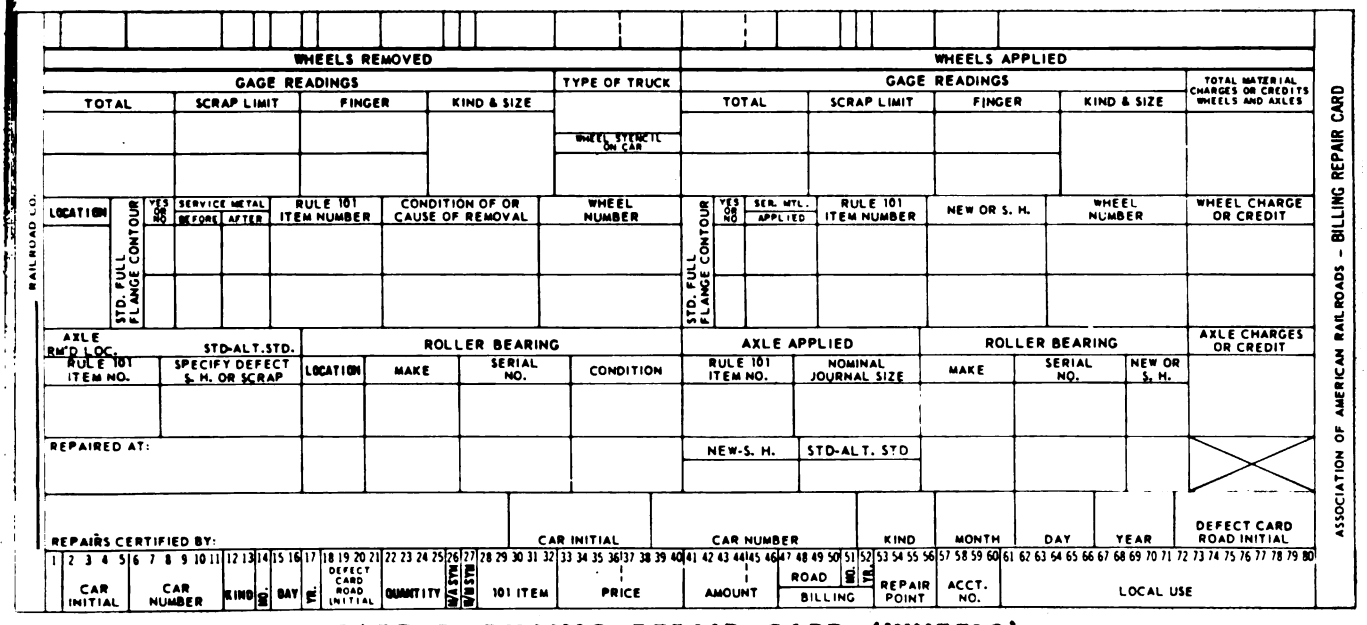
Cards B or B-1 are the prescribed forms prepared in the field to cover the change of one pair of wheels and an axle. Card B is used in manual pricing and mechanical billing. Card B-1 is used in both mechanical pricing and billing. Any information reported on the wheel and axle repair card, other than signatures, may be preprinted and prepunched, if desired.

When using Card B. keypunching of columns 2 to 21 is done in the same way as that of Card A. Columns 22 to 40 are blank. Columns 41 to 46 are total material charges or credits for wheels and axles. Columns 47 to 80 contain information on the repairing road, date, repair point, and account number.

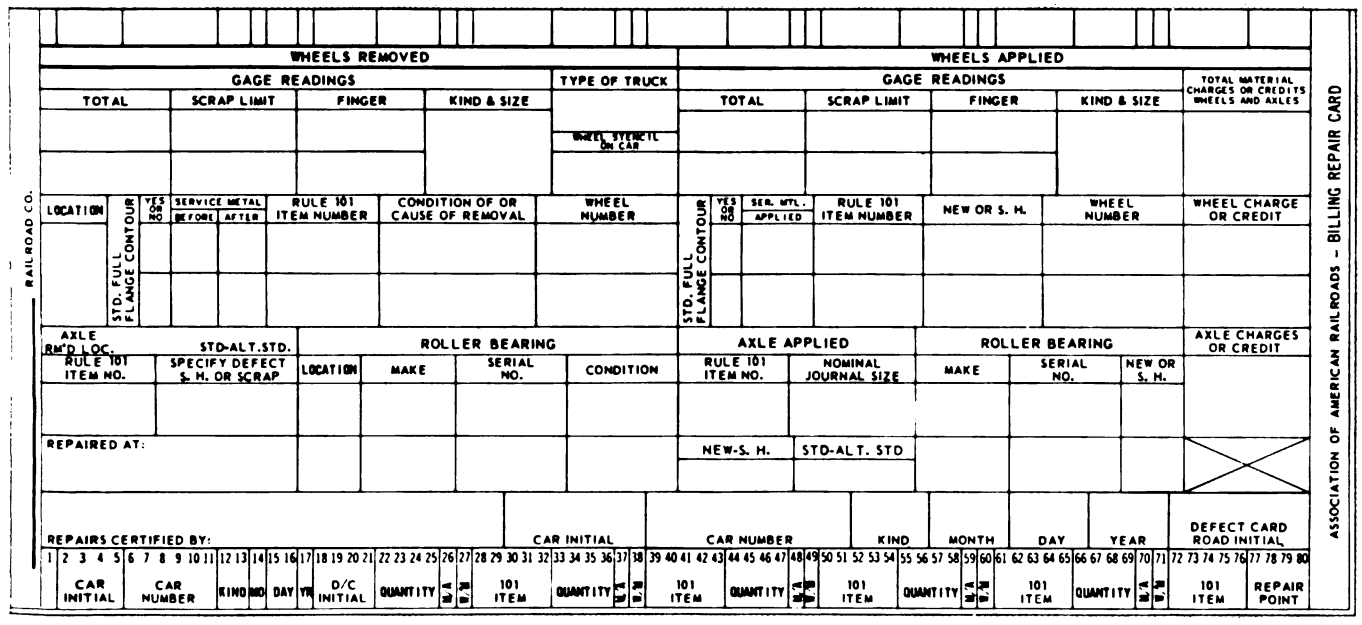
When using Card B-1, keypunching is the same as described for Card A, except where service metal is involved. The service metal is to be punched in quantity columns 22 to 25 and 33 to 36 for wheels removed and in columns 55 to 58 for wheels applied. As is the present practice where service metal is involved, the charge or credit for the wheel center is to be arbitrarily applied. When using Card B-1, posting of a Why-Made symbol K will be used for control of no bill items and keypunched in columns 27, 38, 59, 60 or 71. Other necessary indications should be made for keypunching of additional billing control of information.

The present practice for exchange of wheels other than multiple-wear wrought-steel will be continued. Keypunching of quantity will require the punching of a "1" in card columns 25 and 36 for wheels removed, and a "2" in column 58 for wheels applied. Roller-bearing charges will be continued as per Rule 105. The present practice of reporting exchange of an axle will be continued. A quantity of "1" is to be punched in column 47 for an axle removed and a "1" punched in column 69 for an axle applied. The foregoing relates only to material used for wheel and axle exchanges. Labor charges for wheel exchanges, together with charges for lubricating devices, journal bearings, wedges, and roller bearings must be shown on Card A.

Card C is the working card for machine purposes only. It is generated mechanically by the data processing equipment for each item of repair reported on Cards A and B-1, except that items of repair for which group billing is permissible will not always be used to produce a Card C. They may be summarized into Card C for



CARD B-BILLING REPAIR CARD (WHEELS)



CARD B1-BILLING REPAIR CARD (WHEELS)

reporting totals on a billing statement.

Form D is used for reporting individual charges for items of repair and the total cost of repairs to a given car, generated by a mechanized billing system and not shown on each billing repair card. Billing repair cards, together with work cards, will be forwarded with one copy of the bill in same sequence as listed. The recommended size for Form D is 8½ x 14 in. An original and one copy are required. An additional copy of the bill must be furnished if requested.

Items allowed to be billed on a group basis, as in the present practice, are to be reported as totals. Additional controls relating to separate statements or grouping of billing information are subject to Rules 91 and 94.

All card sizes are 3¼ x 7⅜ in. and can be used in card, pad, or book form in duplicate. Record copy or original is paper stock and duplicate is card stock suitable for machine processing. Effective August 1, 1962, Card A replaced forms shown on pages 335 and 337 of the 1962 Rules. Card B replaced form shown on page 336. Cards B-1, C, and Form D are new. The present Billing Repair Card, Wheels and Axles, shown on page 338 has been modified to coincide with details of other Wheel and Axle forms covered by Cards B and B-1, except for keypunching data, and fully covers manual billing and pricing.

Column 1 of Cards A, B, B-1 and C will be used for keypunching control codes for data processing purposes. Digit 1 will identify Card A; 2, Card B; 3, Card B-1; and 4, Card C.

Adhesion: Limit on Future Diesels?

. . . 'No' Says General Electric's D. R. Meier

Steadily increasing locomotive power ratings, particularly on diesel-electric locomotives, have placed increasing emphasis on adhesion characteristics. Within the past ten years, the power rating of four-axle diesel-electric locomotives has grown from 375 to 625 hp per axle. There have been warnings that exceeding 400 hp per axle would lead to excessive wheel-slip. This figure is far below the 1000 to 1500 rail hp per axle used successfully for more than a quarter of a century on electric locomotives, and even earlier than this on steam locomotives.

Results presently being achieved in regular service with diesel electrics, results achieved in the past with various types of locomotives, and tests of adhesion characteristics all indicate there is ample room for higher per-axle power ratings before adhesion limits are reached. Today's internally powered locomotives are not pushing the accepted limits of normal adhesion, nor operating on the edge of a "slipperiness" limit. There will of course be adhesion problems, even on present locomotives when they are loaded to adhesion limits under bad rail conditions. Power ratings are not, however, high enough to require decreases in adhesion ratings for high-speed operation.

The four commonly accepted concepts of adhesion limitations are sometimes confused:

- Maximum adhesion which the best rail conditions will permit is not subject to locomotive design limits.
- Maximum adhesion which the locomotive is designed to produce for starting may be thought of as the maximum adhesion capability of the locomotive;
- Continuous rated adhesion of the locomotive may be determined by thermal, mechanical, or electrical limitations on the power producing or transmitting equipment and will ordinarily be much less than the maximum capability of the locomotive;
- Adhesion limit imposed by adverse rail conditions which must be considered in establishing tonnage ratings, acceleration and braking rates.

The adhesion performance which may be obtained under any condition depends on the locomotive capabilities, the rail conditions, and the operating speed. The maximum adhesion capabilities of a locomotive in starting a train under good rail conditions are normally two to three times greater than the limiting adhesion obtainable under adverse rail conditions, because the locomotive power plant and transmission are customarily designed for this. Tonnage ratings assigned to domestic locomotives are usually based on the minimum value of adhesion which can be obtained with occasional use of sand under bad rail conditions, and correspond to an adhesion coefficient of 0.18 to 0.20. A tonnage rating made on this basis is well below the maximum tonnage which can be moved under favorable conditions. It is misleading to compare maximum tonnage capabilities of one locomotive type with rated tonnage of another.

Adhesion Limits

As contrasted to tonnage ratings based on limiting adhesion conditions, ratings for high-speed freight operation will involve no adhesion limitation even under poor rail conditions, except during starting. This applies to the levels of power being used today in internally powered locomotives. Any train within the tonnage limits fixed by the high-speed requirements is within normal adhesion limits on a line having no more than 1% grades. As freight train speeds of 60 and 70 mph become more common, the need for adhesion coefficients above 0.20 under running conditions will diminish and may eventually disappear.

Some of the most important factors affecting the adhesion capabilities of a locomotive of *specified weight* on drivers include these factors pertaining to the locomotive itself: 1) Tractive effort capacity of the transmission; 2) truck weight-transfer characteristics; 3) methods of detecting and correcting wheel slip; 4) electric transmission characteristics involving speed of response to changes in excitation, and response to wheel slip as affected by motor connections; 5) dynamic effects of locomotive speed; 6) effectiveness of sanding equipment design

Among the factors external to the locomotive are: 1) rail condition particularly with respect to the presence of a low-friction surface film whether due to the weather, oil, o other unwanted elements; 2) track construction and maintenance; 3) effectiveness of sanding involving the quality of sand and effect of cross winds.

For a given locomotive, the condition of the rail has by far the larges effect on rail adhesion. The difference in adhesion between good and bad conditions is on the order of two o three to one, at any given speed. For given rail conditions, and for a locomotive of particular weight and transmission capabilities, no one of the locomotive factors is predominant.

Adhesion data have been reported both as uncorrected or "normal" adhesion, and as corrected or "true" adhesion. The difference is due to the action of the tractive and internal forces, causing weight transfer in the trucks. This results in making the leading axles lighter and the trailing axles heavier. The correction factor for converting "normal" to "true" adhesion varies with the mounting of the traction motors, the method of equalization, the method of carrying the cab weight on the truck, and the truck design. For the designs of locomotives currently being used in U.S. railroading, the magnitude of the correction factor is from 10 to 17%. Applied to an adhesion value of 20% for the total locomotive, this represents 2 to 3.4 percentage points in adhesion respectively. Although this is an important correction, it is so far outweighed by the effect of varying rail conditions that no great error in conclusions will result from the use of adhesion measurements uncorrected for weight transfer when evaluating the relationship between horsepower per axle and adhesion limitations.

Data taken on the GG-1 electric locomotives of the Pennsylvania showed the adhesion obtainable was limited by the power available rather than by rail adhesion. The GG-1 has a 2—C+C—2 wheel arrangement with each driving axle equipped with twin

Based on a paper "Is Rail Adhesion a Limitation on the Growth of Internally Powered Locomotives?," presented by Mr. Meier at the recent Railroad Division meeting of the American Society of Mechanical Engineers.

otors. The total weight on drivers is 0,000 lb. Nominal rating is 4620 hp ntinuous and 8500 hp for short peri- ls of time, successfully transmitted rough six driving axles. The success- l use of electric locomotives of ap- oximately 1000 hp per axle has also en common in Europe.

The results of tests made on various ilroads during demonstration runs of e four-axle General Electric 2,500- U25B diesel-electric locomotive do t reveal limits of rail adhesion; the wer was not high enough for this rpose. They do show successful op- ation at fairly high adhesion values r significant periods of time.

upled Axles

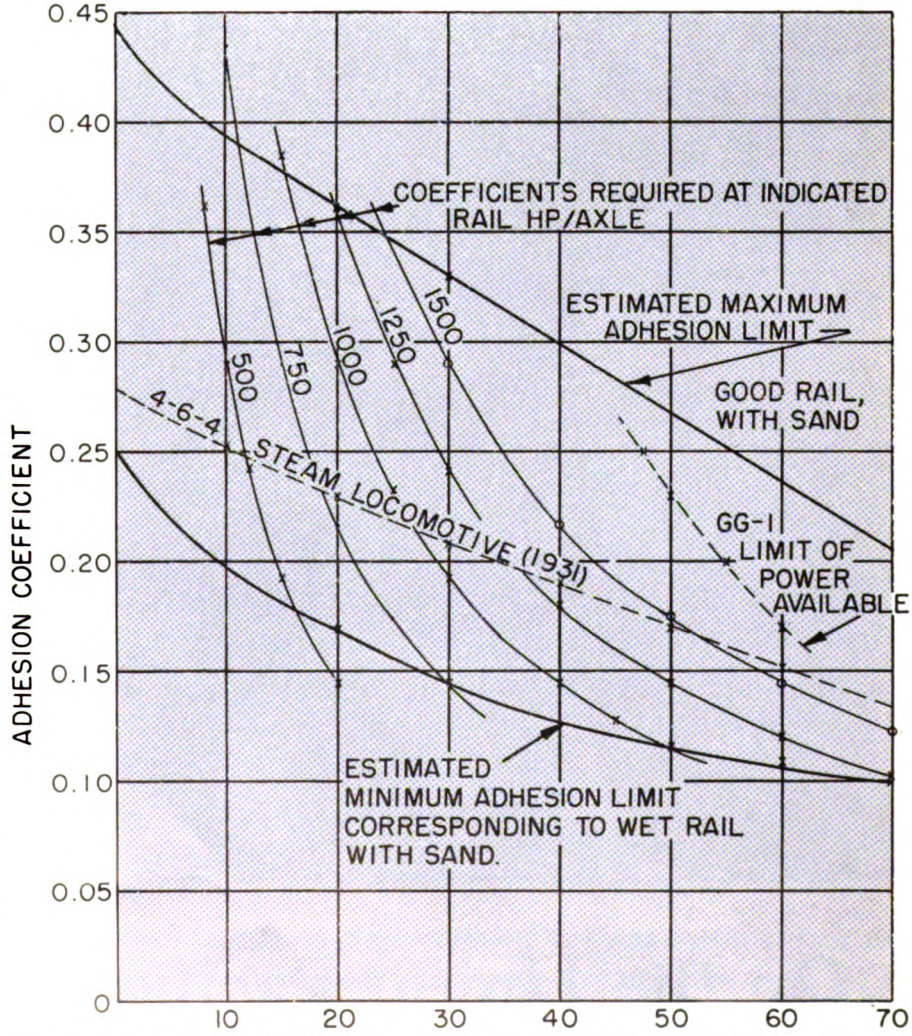
Although there have been compari- ns published indicating that the ad- sion capabilities of a locomotive ving coupled axles are more than uble those of a conventional diesel- ctric locomotive, this seems to be a se of comparing the maximum capa- lities of the coupled drive with ad- sion coefficients corresponding to ted tonnage of individual-axle-drive comotives as established by limiting il conditions.

The increase in adhesion perform- ce due to coupling has been reported be 25 to 30% based on tests con- cted on an a-c locomotive on the vedish State Railways. Of this in- ease, 14.4% was said to be due to e elimination of the weight transfer ect. The remainder of the difference unexplained. It is possible that it is due to the inferior characteristics a-c motors on a trolley power sup- y as compared with d-c motors iven by a d-c generator.

Composite curves incorporating data om various sources indicate that the ea of usable horsepower per axle is atively large. It encompasses values ll up to 2000 hp per axle at the rail. efficient of adhesion falls off gradu- y with speed. The higher horse- wer curves tend to become more arly parallel with the lower adhesion rve. At the higher speed ends of the rves, a decrease in speed is accom- nied by an increase in the lower ad- sion curve almost sufficient to offset increased tractive effort required constant horsepower. This effect is ch less favorable at lower power, a comparison of the curves of 1,500- axle and 500-hp axle will illustrate. The portion of the area lying above 0-hp axle at the rail is presently not available on internally powered locomotives. Judging from the successful experience of many years on steam and electric locomotives, there is every reason to expect that the usable power per axle on internally powered locomotives could be doubled without encountering serious problems of slippage. The steam locomotive characteristic indicates that at 60 and 70 mph the locomotive produced over 1500 hp per axle at the rail.

An advantage of high horsepower often overlooked is that the corresponding higher speed and momentum produced give greater time margin for correcting a slip. When operating under poor rail conditions, the use of sand, the use of an air-brake wheel-slip suppression scheme, the reduction of power, or some combination of these alternatives, is often necessary. With the use of one or more of these devices, it is commonly accepted practice to assign tonnage ratings based on normal adhesion factors of 0.18 to 0.20 and even higher, without regard to the speed at this rating. Experience has shown that even under extremely bad rail conditions, the speed need not be reduced below 8 mph to hold an adhesion coefficient of 0.20.

Power ratings of internally powered locomotives in use in the U.S. today are not high enough to require decrease of adhesion ratings for high-speed operation. It may be expected that improved adhesion characteristics will be developed in the future. For the domestic market, there will be a strong incentive to employ methods which will permit the continued use of the thousands of standard motors and trucks now in service, for reasons of interchangeability. Where the improvements to be obtained will justify the added complication, we may expect to see new designs which are not completely interchangeable. Any improvements will provide added margin for increasing the rating of internally powered locomotives.



Adhesion coefficients available at locomotive speeds up to 70 mph are compared with those required for various horsepower-per-axle ratings. Conclusion of GE's manager of product planning and research is that locomotives with their own power plants could operate at much higher outputs with no train-handling problems resulting from lack of adhesion.



On the Union Pacific . . .

the Revolutionary **GP-30**



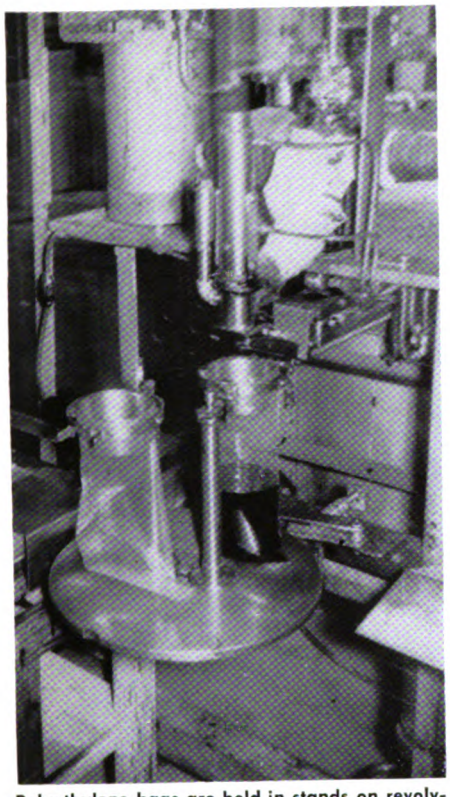
New Revolutionary GP-30's will give unprecedented broad-range capability to Union Pacific's crack freight fleet. The GP-30's offer more operating flexibility — high speed today, heavy drag tomorrow — and will move more gross ton-miles per freight train hour, at lower operating cost, than ever before. General Motors' 2250 horsepower GP-30 incorporates thirty major technological advancements leading to dramatic savings in operation and maintenance . . . a big step ahead in motive power progress.

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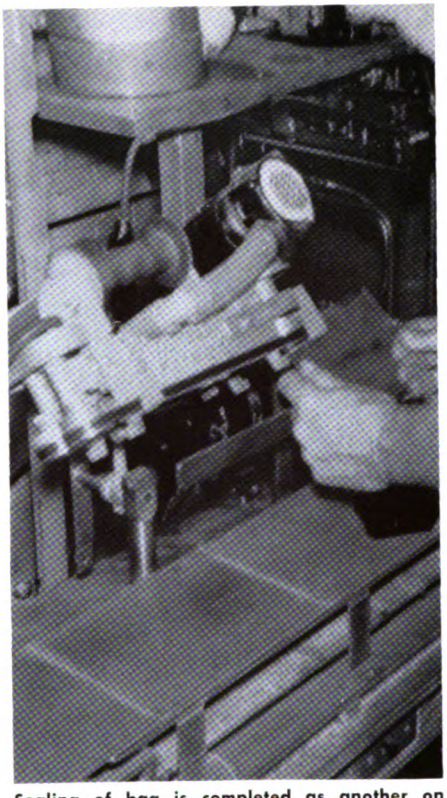
HOME OF THE DIESEL LOCOMOTIVE · In Canada: General Motors Diesel Limited, London, Ontario

GENERAL MOTORS LOCOMOTIVES

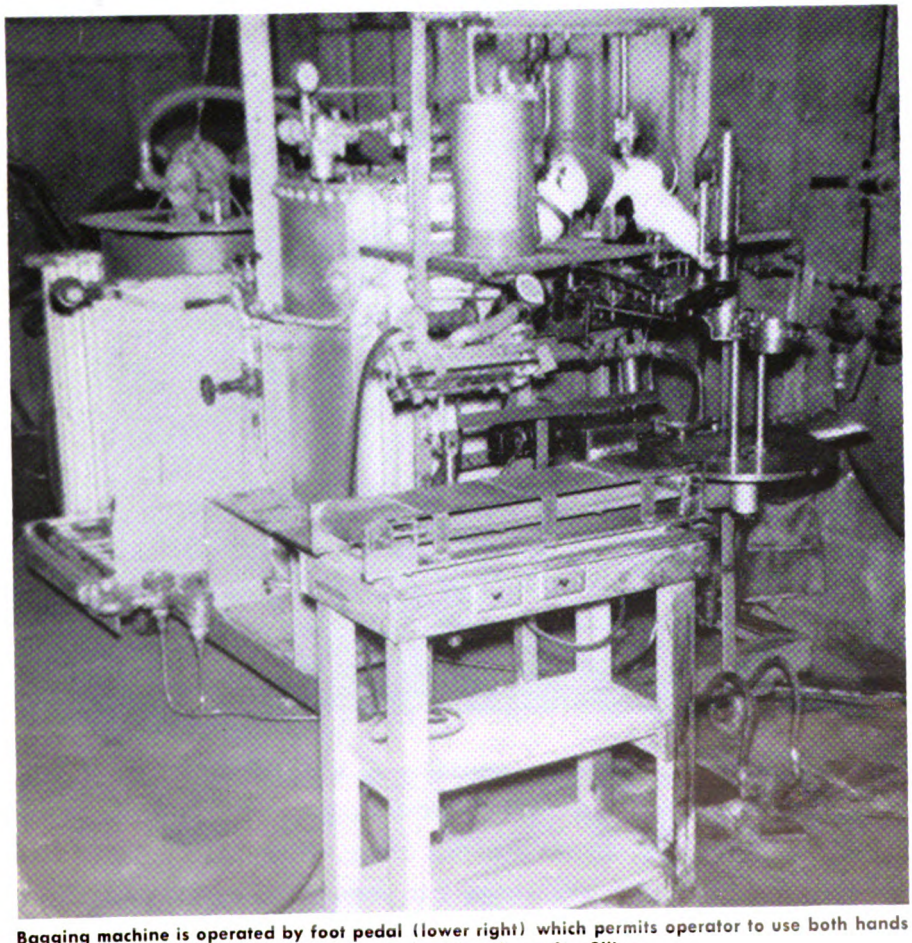
Bagging Device Measures Gear Grease



Polyethylene bags are held in stands on revolving table. Two more stands could be added.



Sealing of bag is completed as another on revolving table is being filled automatically.



Bagging machine is operated by foot pedal (lower right) which permits operator to use both hands for positioning empty bags and removing and sealing them after filling.

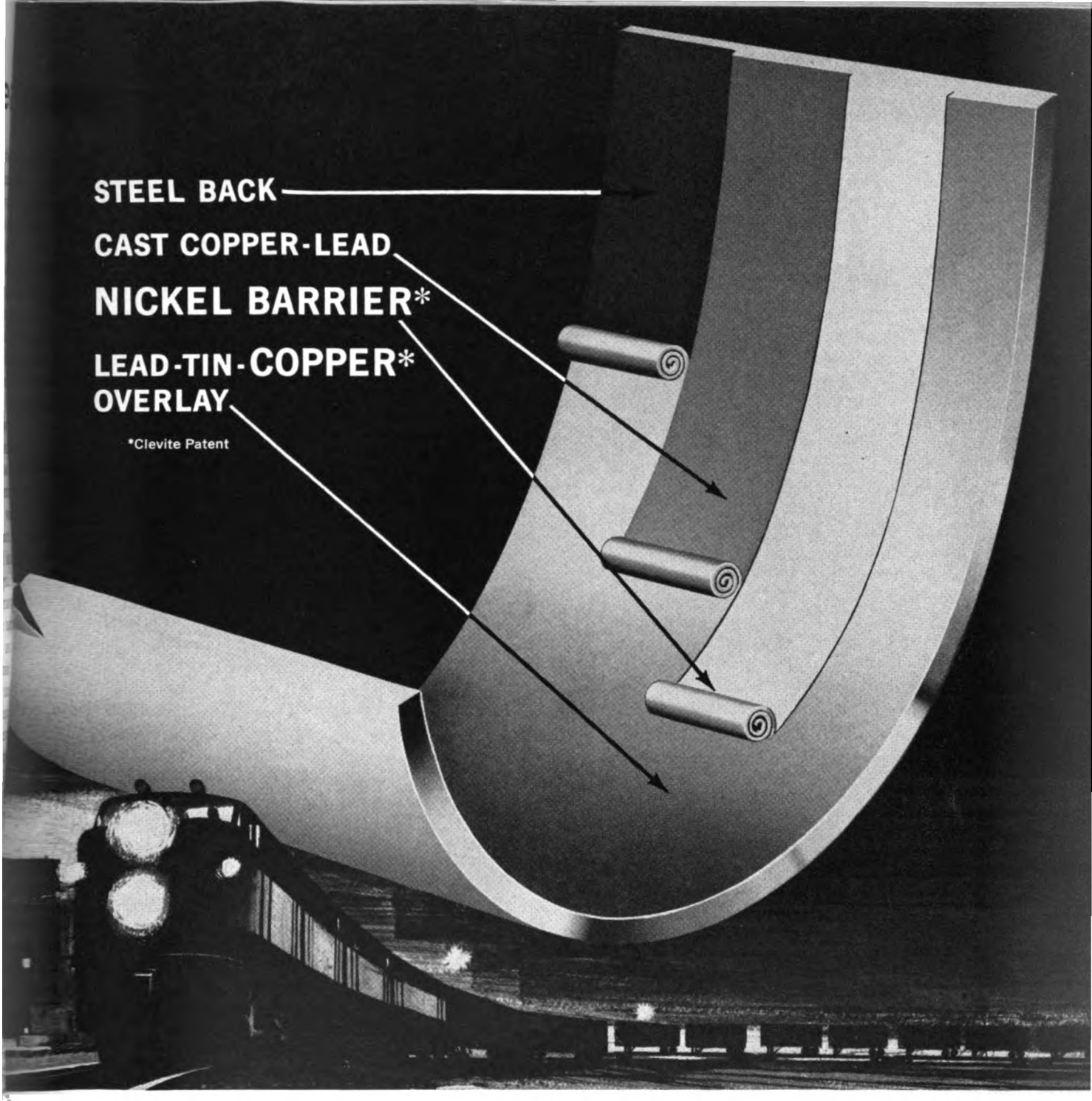
A bagging machine which automatically measures 2-lb quantities of traction-gear lubricant into polyethylene bags has been designed and constructed by the Santa Fe shop at Cleburne, Tex. The device eliminates the handling of the gear lubricant (Crater compound) and takes away any guesswork involved in the amounts added to gear cases. The filled bags are placed in the gear cases with the container becoming part of the lubricant under gear-tooth action.

In the bagging machine care is taken to work the viscous asphaltic lubricant at precisely controlled temperatures. It must be warm to be pumped, but not so hot that there can be a breakdown of its lubricating qualities. Machine capacity depends on the speed of the operator in moving the bags on and off the turntable. One operator can produce an average of three to four bags per min.

The 120-gal storage tank, made of ⅜-in. boiler plate, is equipped with steam heating coils, thermostatically controlled at an operating temperature of 130 to 140 deg F. The gear lubricant, delivered in 55-gal drums, is steam heated in a cabinet on the rear of the machine. It is pumped into the storage tank with a small suspended pump and air motor.

When the storage tank is filled with 110 gal of lubricant at the proper temperature, the filler opening is capped and tightened. The compressed-air supply line is opened, the air regulating control valve permitting 20 psi pressure to be developed inside the tank. The lubricant is piped through a series of valves to a measuring cylinder where it lifts a free piston, so the cylinder contains the quantity of lubricant it is desired to have bagged. Piston travel is variable, so the same amount is placed in each bag as it is filled.

A turntable with two clamp-equipped stands, each holding a bag, is on the operator's side of the machine. It is designed to place each bag, in turn, under the filler valve. Both air and lubricant valves are automatic, timed to operate from one foot-operated air valve. A sliding device in the discharge valve gives a positive cut-off of the lubricant, preventing any dripping and insuring that the table remains clean at all times.



EVITE: New source for EMD bearing replacements

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Low-Level Piggyback Has Spread Sill

A low-level piggyback car with a spread center sill and deck height of 31½ in. is claimed by the builder to be the lowest flush-deck car on the market. The American Car and Foundry Division of ACF Industries, Inc., has introduced this 89-ft model for both TOFC and auto-rack service.

The new design is not only lower, but also lighter than ACF's former low-level model, according to F. H. Boland, ACF vice-president and division general manager. Weight of the stripped car has been reduced to 49,600 lb, deck height above the rail is 1 in. lower, and riser boards at the hitches have been eliminated. This "Low-Level Hitch Hiker, Model II" will be the standard ACF model.

Center-sill webs are spread to an inside dimension of 59½ in. through the middle 46½-ft portion of the car between the trucks. This gives direct support to the load-bearing areas—these center-sill structural members are directly under trailer wheel loads. The builder also claims that the spread center sill increases the torsional rigidity of the car. In converting from the conventional center-sill configuration at the car ends to the spread sill configuration through the center, particular attention was given to avoiding high stress concentrations and to using metals with low-transition temperatures in these critical areas. The latter is an important factor in avoiding brittle fracture in cold-weather operation. The center-sill transition area which connects the fish belly and bolster sections has a wishbone-shaped bottom cover plate tailored to smooth out stress flow and produce minimum stress concentration. A tongue-shaped doubler plate has the dual function of strengthening the bottom cover plate and distributing the stresses uniformly. Lastly, the floor opening is tapered to a circular termination.

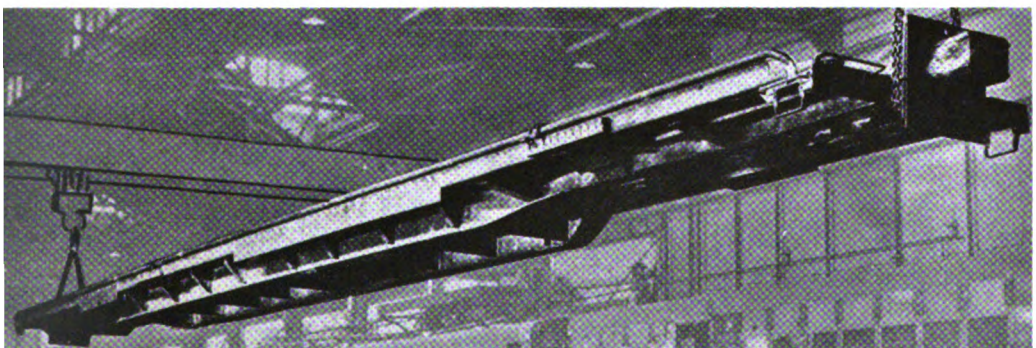
Another feature design is the pressed-channel diaphragm (cross-bearer) with top and bottom flanges to resist flexure bending stresses produced by lateral acceleration of trailers. It has round corners to smoot stress flow and two cantilever en pieces which serve as load-carryin members. The distance between truc centers has been increased 2 ft—fro 62 to 64 ft. This increase results i less end overhang reducing the arc the coupler swing.

Trailer hitches have been recesse 3 in. into the space created by th spread center sill, making possible th elimination of the riser boards forme ly required to raise tractor and traile tires so the axles clear retracted traile hitches during loading and unloadin operations. This is an advantag eliminating the jarring of the traile that occurred while passing over th riser boards and the slowing of loadin and unloading required while passin over the risers.

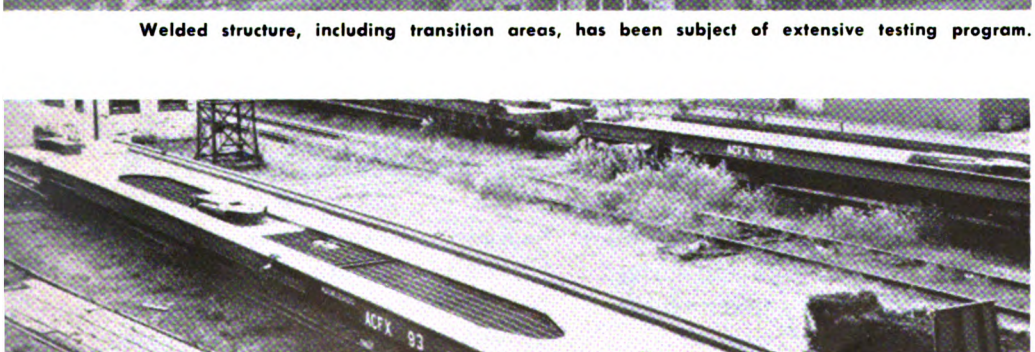
With the 31½-in. floor heigh flanges of the 28-in. wheels would c into the floor plate unless measure were taken to correct this conditio An oblong "dimple" has been presse into the floor plate over each whee giving the required clearance for th most extreme conditions of trac curvature and truck spring deflectio encountered in service. To stiffen th area, a channel is installed on each sid of, and parallel to, each dimple.

Two extensive test programs hav been conducted with the design—laboratory test to determine structura integrity and a service test to evaluat the car in every day service. To com press the test period, two prototyp cars were built. One was subject t impact tests and to road tests to estab lish the stress level that would be en countered in service. The second ca was subjected to a fatigue test progra that simulated the stress levels dete mined by the road test.

It was loaded with the same 40-trailers used on the first car. The ca was instrumented with 30 strai gages in the same locations as thos on the first car. The stress spectru computed from the road test da was used for the fatigue test. The ca was then subjected to forces of th amplitude and frequency necessary t produce the requisite stress level f three million cycles, representing te years service life at the above-averag stress levels. The car received a simu lated accelerated service life to dete possible fatigue areas.

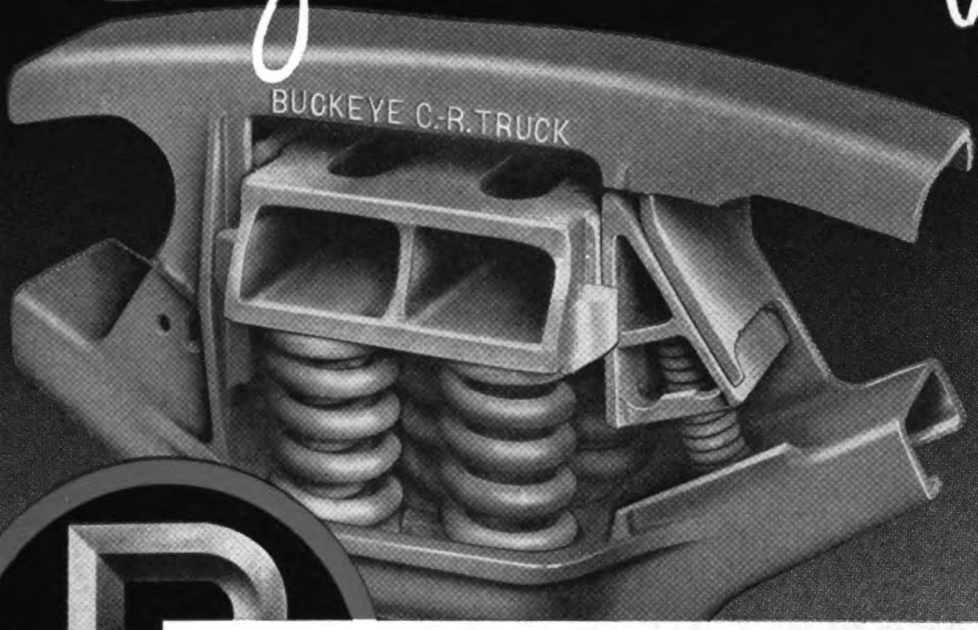


Welded structure, including transition areas, has been subject of extensive testing program.



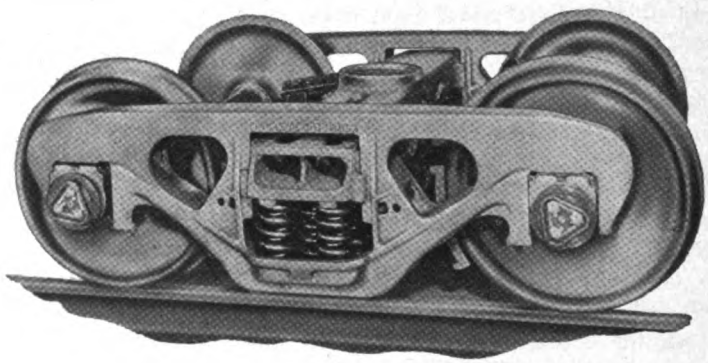
Road test involved 1,060 miles of operation with two 65,000-lb trailers loaded on car.

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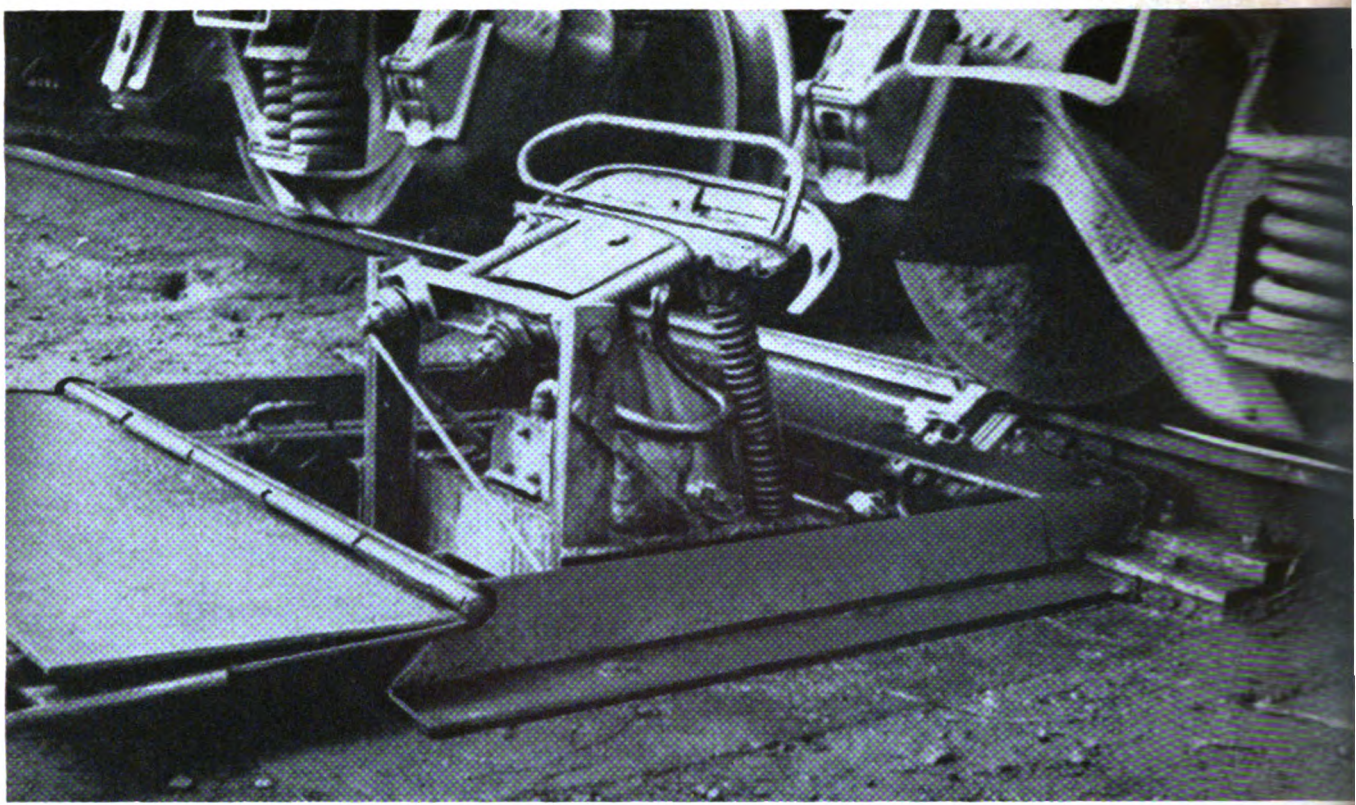
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Oiler, which injects about 6 oz of oil as box passes, opens and closes lid automatically. It is retracted into pit before caboose passes.

Automatic Oiler Speeds GN Servicing

The Great Northern's automatic journal oiler in the Allouez, Wis., ore yard services the journals of moving 205-car ore trains in 15 to 20 min. By hand, this required about eight man-hours. Some 1,291,344 journals have been oiled since the machine was installed in July 1961. GN's mechanical officers report direct savings to November 1, 1962, amounted to $16,507. Indirect savings, based on an average wheel-change cost of $200 and 63 fewer wheel changes in approximately the same period, amounted to $12,600. In 1960, the last full ore season before the automatic oiler was installed, there were 83 hot boxes. For this season, there have been only 20. The GN has 7,715 ore cars working during the seven-month season.

Here's how the automatic oiler works: 1) opens a passing journal box lid at speeds up to 9 mph; 2) holds the lid open from 1½ to 2 in.; 3) injects 6 oz of oil in 1/30 sec at 225 psi; 4) forces the lid shut, automatically compensating for train speed; 5) retracts to a below-the-rail position, clearing locomotives as well as cabooses.

When a train to be oiled enters the machine area at approximately 5 mph, pushbutton controls, operated after the locomotive passes, raise the oiling heads out of their pits. Flanges of each pair of wheels depress inclined treadle bars which simultaneously actuate the box-lid opening heads. The left wheel rim of the car truck engages a proximity switch 11-in. in advance of the point where the oiling nozzles are in position to discharge. The switch energizes a timing device adjusted to compensate for train speeds. When the solenoid valve actuates the oil discharge valve, another timing device determines the duration of the oil valve openings. This timer determines the amount of oil injected into the box. Tests have shown that the volume of oil can be controlled from 2- to 8-oz depending on requirements.

After the trailing edge of the box passes the oil nozzle opening, the flanges of the wheels disengage from the treadle bars. The lid opening head depresses the lid to closed position. After the train is oiled, the controls return the oiling heads below track level. Hard facing weld compensates for minor wear on the heads caused by lid opening and closing.

Oil is stored in a 12,000-gal tank car, and fed by gravity into a 500-gal storage tak heated to 120 deg F. A 35 gpm hydraulic supply pump, driven by a 7½-hp motor, circulates oil through the piping system so that all elements of the oiler are brought to a constant temperature prior to oiling and during the oiling operation.

An accumulator, consisting of a cylinder equipped with a floating piston, having air at 175 psi on one side and oil on the other, is installed in the oil-nozzle circuit. It assures full pressure during the injection period. The

(Continued on page 45)

Typical Four-Month Operation Of the Automatic Oiler

Cars oiled	64,350
Oil injected into boxes	17,864 gal
Oil injected into each train	55½ gal
Oil injected per car	1 qt 3 oz
Oil injected each box	2 to 8 oz
Cars per train oiled	200
Time to oil one train	15-20 min
Time to oil one car	5.8 sec
Time to oil one box at approximately 5 mph	¾ sec

Understanding Semiconductors

y R. I. Fort and R. L. Brittin

The most common substances found electrical equipment are conductors -carriers of electrical current, and sulators—materials that pass such nall amounts of current that the flow ın usually be neglected. In the con-ıctor category are such materials as ›pper, brass, aluminum, carbon, and lver. Insulators include mica, rub-:r, clean dry wood, glass and air.

Some conductors are much superior others. The same may be said of sulators. The intermediate range :tween the two extremes is very 'oad and is so dotted with the char-:teristics of hundreds of available aterials it would be difficult to draw line and say "this is where conduc-›n ends and non-conduction begins."

It is fortunate that the intermediate nge materials are available. Other-ise, the use of electricity would only : incidental and the electronics field ›uld be non-existent. Even the de-gn of the light bulb would be impos-›le. If the present filament were re-aced with a highly conductive ma-rial, we would simply burn some-ing up when we close the switch.

Most of the intermediate range ma-rials have been recognized and used r the past 70 years. With the excep-›n of the "conducting stream of elec-›ns" in the radio tube, the resistive 'ect that any of these materials has ı an electrical circuit can only be :ered by changing their physical di-:nsions. Temperature also does have me effect.

During the past 10 years new alloys ve been developed and assembled :o devices generally known as semi-nductors. These include transistors, ›des and silicon-controlled rectifiers CR). This is only a partial list; there : many exotic combinations de-loped for special applications. The portant characteristics of all of :se is that, without any physical or :chanical motion, the electrical re-tance can be altered from highly nductive to highly resistive. Many n be held at any value between.

The resistance value is controlled by passing minute currents through certain control paths inside the semiconductor and thus altering the path taken by the power current. It is not uncommon for a small amount of power to control 1,000 times its own value. As an added feature, the change from minimum to maximum can be made very rapidly, several million times a second, if necessary. Such qualities make semiconductors very useful substitutes for switches and variable resistors.

At present, it is expected most of these devices will last almost indefinitely. When designed into proper circuits and not abused, it is reasonable to believe that they will require little attention because they are all sealed and have no moving parts. Generally speaking, if there is no obvious trouble and all associated equipment is functioning properly, it is safe to assume that semiconductors need no attention except to be kept free of abnormal quantities of dirt and to be visually inspected for broken, loose or worn wires. Particular attention should be given to insure that power leads are tight in heavy current circuits.

The relative simplicity of these devices, the possibilities they offer for reduction of circuit components, and the continued reduction in first costs resulting from research and improved production methods indicate that sooner or later their economy will result in their use as solutions for many electrical problems. Semiconductor devices are not foolproof and, to be successfully used, it is necessary to appreciate the difficulties that can arise. Some of the conditions known to destroy these devices are excessive heat, excessive voltage, excessive current, and reversed polarity.

Excessive Heat. Most semiconductors now in use have an absolute maximum temperature rating of about 212 deg F without current flowing, even lower when operating. This means that ventilation must not be cut off, use of a torch at close range should be avoided, and soldering of semiconductor leads should be done so as to prevent heat from traveling up the lead wire. When renewing a semiconductor that is attached to cooling fins, be sure to make a good solid contact. It is preferable to use a thin coat of high temperature silicone oil or grease between the metal surfaces to insure good heat transfer. In case an insulator is found between the semiconductor and the fins, do not alter its thickness or composition without consulting someone familiar with the design. Again, use the oil or grease.

Excessive Voltage. The devices will not stand voltage beyond their ratings for even 1/1,000,000 sec. Inductive kicks from solenoids and field coils, if not properly suppressed, are serious hazards. Voltages from bell ringers and insulation testers can cause permanent damage and should not be used until semiconductors have been disconnected from circuits. When "motoring" d-c generators on car-lighting equipment in which a diode has been installed to function as reverse current relay, it is important to *first* pull the generator fuse and then shunt out the diode. Do the motoring with a fuse, using an enclosed type to avoid possible injury from burn out.

Excessive Current. While high currents do not cause damage as quickly as high voltage, the time involved may still be less than one second, depending on the size of the overload. In view of this, it is important that fuse sizes not be increased without consulting the designer. Avoid jumping fuses, shorting out circuits to see if they are "hot," and flashing circuits to ground with pliers or screwdriver. On locomotive radio equipment the cooling fins are part of the circuit and care must be taken when removing screens and covers to see that these fins are not shorted or grounded. The safe way: kill the power before opening.

Reversed Polarity. All semiconductors have definite positive and negative terminals that must be observed when they are placed in a circuit. If this is not done, the circuit will not operate and the possibility is good that damage will result.

In working with semiconductors, it is very improbable that a new one will be defective. There is also small chance of semiconductor failure in a circuit that has been properly designed and applied. When repeated failures are encountered, be sure this information is properly reported.

[TO BE CONTINUED]

t of a series of articles explaining basic iiconductor operation and testing for Illinois ıtral electrical department employees. Mr. t is electrical engineer — equipment; Mr. tin traveling electrical inspector.

What Is Your Problem?

Prepared in cooperation with the Locomotive Maintenance Officers Association, these are offered as practical—but not the only—solutions to current locomotive problems. Material is compiled by the LMOA "What Is Your Problem?" Committee under the chairmanship of J. J. Dwyer, chief chemist, Chesapeake & Ohio. Along with problems and solutions submitted by LMOA members, those sent to the Editor by other readers are welcomed and published.

Winterization

Is it practical to winterize diesel units by pressurizing the engine rooms by diverting air discharged from cooling fans?

Electro-Motive, in cooperation with a number of the northern railroads, has conducted winterization tests for many years. As a result of these tests, the most common type of locomotive winterization was developed. This scheme incorporates an air duct above one of the cooling fans through which heated engine room air can be drawn during the cool weather.

It is possible to pressurize or at least minimize the negative pressure in an engine room by blocking the cooling fan and discharging the air through the winterization duct to the engine room. This is not recommended due to serious low water temperatures which would prevail when idling. Attempts to pressurize the engine room with the cooling fans would, of necessity, permit the engine room to draw all of its air requirements through the radiators even under idling conditions. This reduces the water temperature during cool weather idling, and is not recommended. The present winterization duct system on Electro-Motive units has proved quite satisfactory in most types of service and is recommended on older units.

The GP-30 locomotive does employ an intertial type filter which has operated successfully under snow conditions and does permit pressurization of the engine room. Unfortunately, this system cannot be readily applied on older units.

Max Ephraim, Jr., assistant chief engineer, Electro-Motive Division, General Motors Corp.

It is practical to winterize diesel units by pressurizing the engine room by diverting air discharged from cooling fans. The practice has been carried on for years on the SP Northern district by reversing the direction of the No. 4 cooling fan and blanking off of certain carbody filters to provide for winter operation.

K. Pruchnicki, supervisor locomotive maintenance, Southern Pacific.

Modified Coupler

In Type E couplers modified from the ball-and-socket design to a straight pin and straight bushing, what should be done to overcome the bell-shaped bushing wear which occurs after the modification has been made according to coupler manufacturer and EMD recommendation?

In January, 1961, modifications were initiated to convert Type E ball-joint couplers to a solid-pin design. This was accomplished by removing the ball and bushing from the "banjo shank" and applying a solid bushing in its place. High maintenance cost led to this conversion and the aim was to provide an economical means of remedying an expense-provoking condition. The converted couplers were placed in service with the coupler carrier on the locomotive unit modified to a solid type carrier as suggested by both the locomotive and coupler manufacturers.

After approximately six months we discovered that the solid bushing in the coupler shank was becoming distorted. The distortion was taking place at the front and back side of the bushing on the top and bottom surfaces of the 4-in. pin hole. In effect, the strain on the pin was being transferred to the 4 in. x 4⅝ in. inner bushing and, in turn, was transferred to the large cast bushing used to replace the ball joint arrangement.

After analyzing the conditions that brought about the wear, it was decided to restrict the vertical movement of the coupler shank between the carrier iron and the vertical striker. We were limited as to how much this restriction could be and still retain clearance enough to enable the removal and replacement of the couplers. A clearance of 1⅜ in. was found to be suitable an the coupler shank when positioned t this dimension in a level plane.

The restricted vertical movement o the coupler shank and the level settin of the coupler work together in pre venting undue strain upon the couple pin and bushing surfaces.

We have not operated any units lon enough to evaluate the benefits gaine by the use of these measures. Th bushing manufacturer has since noti fied us that a change in the bushin material and design was forthcomin and additional relief is to be expecte due to these changes.

Reclamation of the bushings dis torted in service was made by borin the inside diameter of the solid cas bushing to 5 in. and applying a piec of steel tubing 4⅝ in. inside diamete x 5 in. outside diameter to it. Th standard 4 in. x 4⅝ in. bushing orig inally furnished by the manufacture was then inserted in the reclaimed cas bushing.

C. A. Love, chief mechanical officer, Louisville & Nashville.

Brake Freezing

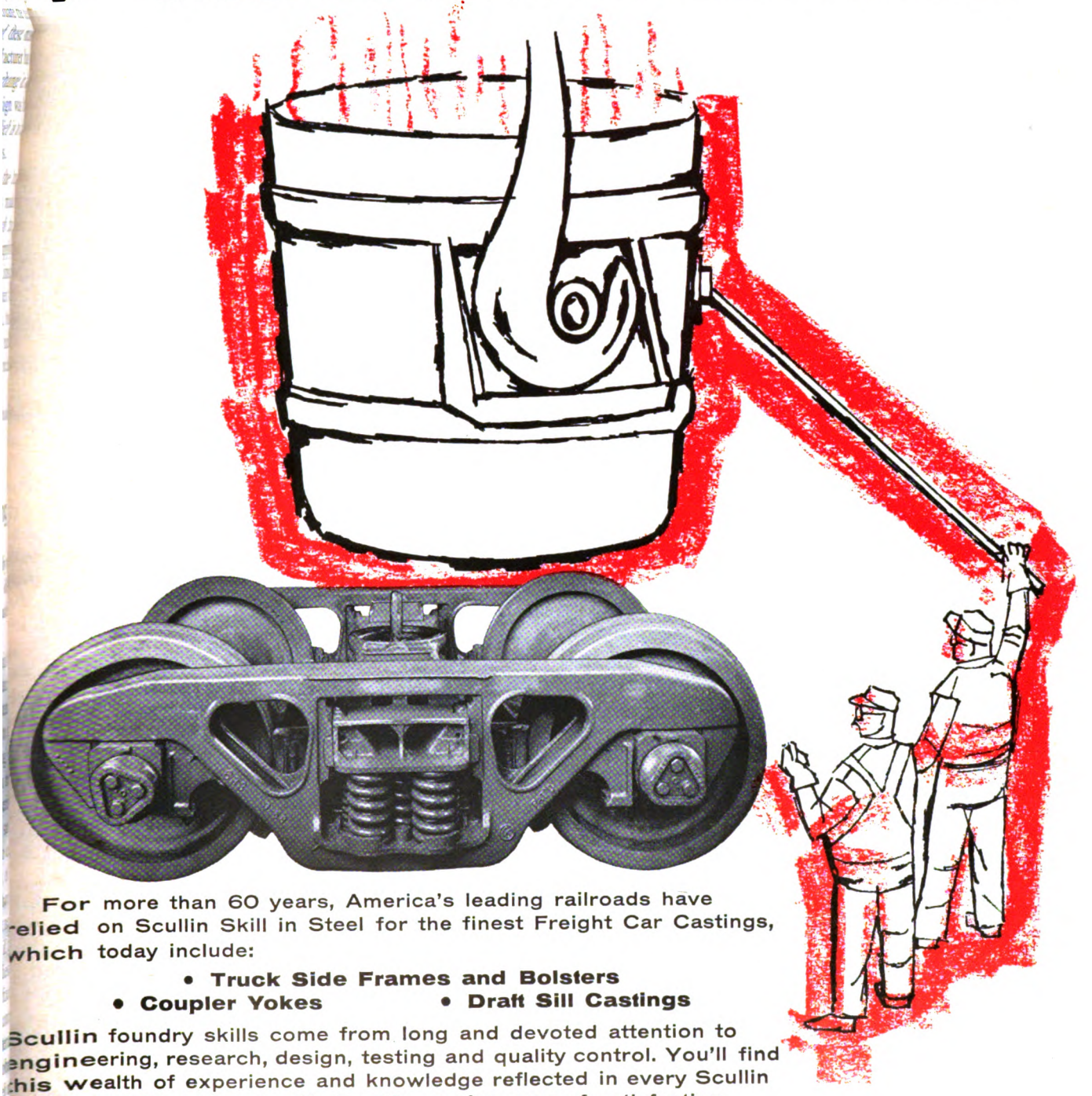
Is it necessary to apply alcohol to air-brake systems of diesel units during severe cold weather?

The greatest source of air-brake trouble during low temperature is the formation of ice in the system. Moisture must also be drained to prevent ice from affecting sanding equipment. Frozen and burst main reservoir dirt collectors have caused serious train delays. Frozen horn and sander air-line dirt collectors have also caused diesel units to be taken out of service en route. Some railroads have found that the use of alcohol is not necessary during the colder seasons if the moisture is drained from the diesel air-brake system. One railroad fixed the cause of stuck rings in brake control valves of passenger cars last winter as a reaction of the lubricant and alcohol. The daily air-brake test for diesel units on this road requires that the cut-out cock for the main reservoir automatic drain valve be inspected and known to be open; the automatic drain valve must be functioning properly. Moisture must be drained from the No. 2 main reservoir and from dirt collectors.

J. R. Mitchell, assistant electrical engineer-equipment, Illinois Central.

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GP-30's Feat-Performing Features

By Gordon Taylor

"It has just about everything it needs, and what it doesn't have, it doesn't need." Doc Watts was answering another question about the GP-30 diesel locomotive. Doc had just returned from the EMD factory where he had received instruction on the GP-30's which were shortly to be delivered to his railroad. He was telling maintainers at Centerville what he had learned about the new units.

"You asked for an outline of the important features of the GP-30," said Doc. "I'll start in the engineroom and tell you about some of the things that seem most important. First, there is the single-package pressurized cleaning system. This central air system eliminates carbody filters and traction-motor blowers, supplying filtered air to the engine, generator, traction motors, and high-voltage cabinet. I know you must wonder how filtered air can be supplied if there are no carbody filters. Air is actually taken into the hood by three separate systems—engine cooling, dynamic-brake-grid cooling, and the filtering arrangement.

"Radiator cooling air shutters, high on either side of the hood end of the locomotive, control the flow of air to a compartment separated from the engineroom by a drop ceiling. This compartment houses the engine-cooling radiators and fans. There are three a-c motor-driven fans. Fans 1 and 3 have 25-hp motors, while Fan 2 has a 12-hp motor. Air for engine cooling is completely separate from the other air systems and is not filtered. Air for dynamic-brake-grid cooling is also unfiltered.

"Air to be filtered enters at the top of the locomotive hood behind the cab where air-borne dirt is at a minimum. It goes into a compartment from which air is drawn by these "air-hungry" devices:

- Turbocharger, which is preceded by intake filters;
- Traction motor blower, which is a mechanically driven fan powered by the engine crankshaft, delivering ventilating air through ducts to all four traction motors;
- Generator blower, which forces air through the generator and into the engineroom, cooling the generator and pressurizing the engineroom to prevent entry of dust.

"The air to be filtered passes through two 11-cell inertial air filters (one in each intake opening) where it is cleaned. The demand of the air-consuming devices causes outside air to flow rapidly through the wedge-shaped filter cells. Dirty air enters the wide end of the cells, and dust particles, because they are heavier than air, tend to travel in a straight line, being carried into a bleed duct.

"Air from which the dirt has been separated centrifugally passes through the narrow side passages in the filter cells. Bleed air, containing dirt, is drawn through an electrically driven bleed blower and is expelled through the locomotime roof. This electrically driven blower, powered by a 10-hp a-c motor, is known as the filter blower. Ten per cent of the air entering the engine's cetnrifugal separator is discharged to atmosphere, carrying off filterable material and making this a self-cleaning filter.

"Air for fuel combustion really needs to be clean. It is given additional filtering before the turbocharger feeds it to the engine cylinders, passing through six more inertial separation filters. Openings of these filter cells impart rotation to the air as it enters with centrifugal force, again causing dirt particles to move outward to a discharge tube. The clean air is directed to the turbocharger for delivery to the engine cylinders. Dirt from these separators is also carried away by the bleed blower. An air-filtering system that cleans the air and simultaneously cleans the filters is certainly an improvement.

"Prime mover of the GP-30 is the GM 567-D3 16-cylinder diesel. Its turbocharger is driven directly by the engine gear train at low engine speed, and by the engine exhaust at higher speeds. This engine is similar to the 567-D2 engine used on the GP-20 unit, but delivers 250 more horsepower and is equipped with turbocharger aftercoolers. Improved engine performance has been achieved by using 15-port cylinder liners, pistons of completely new design, and needle valve injectors. These injectors and the 15-port cylinder liners are claimed to give a specific fuel consumption 10½% better than that of the unsupercharged Model C engines.

"On the GP-30, power is transmitted to the axles by four D57 traction motors which are capable of delivering the higher horsepower at all locomotive speeds. With 62:15 gearing, these motors can be operated safely at speeds up to 71 mph instead of being restricted to 65 mph as were the older units.

"The new traction motor has a 965-amp current rating compared with the 900-amp rating of the D47 motor previously standard on most EMD road locomotives. Improved insulation and new assembly techniques are expected to increase motor life, reducing maintenance requirements. Among other improvements are brush holders with constant-pressure springs and new traction-motor support bearings that have felt-flange lubricators to increase bearing flange life.

"Ability of the manufacturer to continue to improve the horsepower rating of the traction motors is really something. Within fixed space limitations, the builder has continued to produce motors of increasing capacity. Consider Models D7, D17, D27, D37, D47, and now the new D57. Development of new and better materials has been the answer.

"Since we are discussing the GP-30's traction motors, it might be well to consider the method by which their electrical connections are changed to make transition. We can also compare this older method, seeing what progress has been made. On our fist EMD units—the FT and early F-3—transition was made manually. The engineman operated the transition lever by hand when traction-motor connections had to be changed to meet train handling requirements. The engineman was guided in his handling of the transition lever by the ammeter connected in the armature circuit of the No. 4 traction motor. Starting with some of

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

ıe later F-3 units, transition became utomatic. Not only did this relieve ıe engineman of an exacting task, it :sulted in more efficient operation of ıe locomotive. The first automatic ansition systems used only single-:ep shunting of traction-motor fields -providing four transition steps.

"Because the early automatic tran-tion systems proved so worth while, ıe builder has sought further im-rovement, more exactly meeting the eeds of high speed and heavy trains.

"On the GP-30 this has been ac-ɔmplished by use of a programming witch. This programming switch is ıotor-driven and cam-operated. The witch motor has permanent-magnet eld poles, with the armature fed by ırrent from the auxiliary generator. he armature current is controlled by arious relays and interlocks. The di-:ction of rotation of the programming witch motor is controlled by the di-:ction of current fed through the arm-:ure circuit.

Circuits have been simplified by iis multiple-pole, ten-position switch. derives its name from the fact that programs the locomotive through n transition positions. The transi-on positions cover a speed range of 2 to 71 mph for 62:15 gearing. The n positions are:

1. Series-Parallel—Full field;
2. Series-Parallel—24% field shunt;
3. Series-Parallel—40% field shunt;
4. Series-Parallel—49% field shunt;
5. Series-Parallel—54% field shunt;
6. Series-Parallel—60% field shunt;
7. Series-Parallel—65% field shunt;
8. Parallel—Full field;
9. Parallel—40% field shunt;
10. Parallel—54% field shunt.

"The ten transition steps are auto-ıatically controlled by two E-I transi-ɔn relays—FTR and BTR. Forward ansition relay, FTR, by picking up, itiates all forward transitions during ain acceleration. Backward transi-ɔn relay, BTR, by dropping out, ini-ates all backward transitions when ıe train is decelerating. It is interest-g to note that only three motor field ıunting contactors—FS1, FS2, and S3—are used in combination to ac-ɔmplish the six steps of field shunting.

"To analyze all steps and control rcuits that operate the program switch would be too detailed. We can say that it is very accurately controlled at all times. Movement of the switch motor is stopped by interrupting the flow of current through its armature. Since this motor has a permanent-magnet field, current is generated by the armature rotation. This current is dissipated in two 250-ohm resistors which act as a dynamic brake to stop the armature and switch abruptly. This gives extremely accurate control of transition.

"Control of main generator excitation is through a static system having a magnetic amplifier to regulate current in the main generator's separately excited field. The magnetic amplifier is made up of three saturable-core reactors and a three-phase silicon rectifier. A-c current from the D14 alternator is rectified and regulated. D-c current for this excitation on earlier locomotives has come from the auxiliary generator and battery. Although the exciting current on the GP-30 unit comes from the alternator, the separately excited field of the main generator is still called the battery field. The static control team consists not only of the magnetic amplifier with its three reactors (FM1, FM2, and FM3), but also the main generator transductors (MGT-A and MGT-B) which supply a feedback signal proportional to main generator current, and the generator voltage transductors (GVT-A and GVT-B) which supply a feedback signal proportional to main generator voltage (RL&C, October 1962, p 46; November 1962, p 36).

"These feedback signals influence the operation of the power limit relay (PLR), while the load regulator controls the value of the exciting current. It should be understood that the feedback control functions only as an adhesion control system; the engine governor still has the job of controlling the engine power output. We will have to discuss other features at another session," Doc concluded.

GN Car Oiler

(Continued from page 40)

ore cars have 6 x 11 journals and 33-in. wheels. Distance between box centers is 60-in. and average distance between box centers of adjacent coupled cars is 48-in. Variation in overall width across car between box-lids is ¾-in. maximum. The accumulator provides for adequate pressure and oil volume between the short injection periods at normal operating speeds of 5 mph. At this speed, the machine functions best for oiling and requires minimum maintenance. The machine misses about one per cent of the boxes mainly because of deformed lids.

On cars equipped with roller or sleeve bearings, the operator can manually cut out the circuit which controls the oiling heads, preventing the spraying of oil on the exteriors of the bearing housings.

GN's cost analysis of the oiler's performance, based on carman labor of $21.53 per day, shows a saving of $0.1007 per car or $20.64 per train of 205 24-ft ore cars. Time savings amount to 2.24-min per car or 7 hr 40 min per train. Assuming it would take 20-sec to open, oil and close box, and walk to the next box, it would require approximately eight man-hours to oil the 205 car train. This includes refilling of oiling cans and other miscellaneous tasks. The automatic oiler services a similar train in less than 20-min.

R. E. Johnson, GN mechanical engineer, points out that the machine in its present form is only suitable where low car configurations do not prevent its use. Solid trains of GN ore cars present no such problems. "Perhaps sensing devices can be developed which can efficiently control the automatic oiler to work with mixed trains. There is a good possibility that the oiler, designed primarily for ore car operation, can be adapted for use in standard freight train service with proper improvement and modification," Mr. Johnson says.

Development of the automatic oiler began in 1958. In 1960 a prototype was installed in the GN Jackson St. shop at St. Paul, Minn. Trackside foundations were completed at Allouez in 1961, and the machine went to work on July 1, staying in operation until the end of the ore season, November 3. The oiler went back to work March 15 of this year and worked reliably throughout the season.

The project involved L. R. Amundson, mechanical engineering department draftsman; R. E. Johnson, mechanical engineer; James Summers, shop superintendent; and foremen W. Johnson, E. Dock and P. Benjamin. Patents are being sought to cover the device known as the Amundson automatic journal-box oiler.

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RF&P Shop

(Continued from page 24)

tween Tracks 6 and 7 contains a se ries of special shop areas:

- A 58- x 39-ft blacksmith sho completely equipped with forging an welding equipment;
- A 60- x 39-ft compressor an boiler room with two 350-hp oil-fire steam generators and two motor driven compressors having a total ca pacity of 1,800 cfm;
- A 40- x 30-ft automotive equip ment repair shop equipped for work ing highway, off-highway and sho motor vehicles;
- A 40- x 30-ft shop maintenanc area;
- A 40 x 58-ft air-brake sho equipped for the cleaning, repair an testing of car and locomotive brake equipment.

The air-brake shop, which is adja cent to, but separated from, the main shop area, is centered around a U-shaped roller conveyor which moves the brake-system components between the series of operations involved in their periodic overhaul. Skids of brake material are delivered to an alcove from which the roller conveyor leads into the air-brake shop. Along the initial 30 ft of conveyor are six cleaning benches installed in back-to-back pairs and each equipped with a cleaning tank, gasket board, and parts bins. A Crane Lapmaster has been installed adjacent to these benches. Across the end of the shop and along the opposite wall are the test racks for various types of freight car, passenger car, and locomotive brake equipment. This is followed by three benches where brake components are repaired when they fail to pass rack tests. Delivery of brake components to and from this overhaul area and movement of other types of car and locomotive components throughout the shop requires the following materials handling equipment: eight "Trucksters," four fork-lifts, and two crane trucks. Major locomotive and car components can be moved through the main shop bay by a Whiting 120-ft traveling bridge crane equipped with a 30-ton main hoist and 5-ton auxiliary hoist. This crane is equipped with both cab and pendant controls. The crane covers all the tracks in the shop except the run-through locomotive servicing track. Several jib cranes are installed in main shop areas and in specialized work sections.

A 22-ft, 5-ton bridge crane operating across the main bay of the shop covers the wheel-shop area which is between Tracks 6 and 5. Wheel-shop equipment includes all machine tools necessary for manufacturing new car and locomotive wheel sets, for restoring tread contours, and for journal refinishing.

Opening into the main shop bay opposite the air-brake shop is the 29- x 0-ft electrical shop, a 39- x 60-ft parts reclamation shop, and a 39- x 0-ft parts cleaning area. The parts cleaning room, equipped with a 1,200-Magnus Aja-Dip cleaning machine, connected to the adjacent parts reclamation shop by a roller conveyor. Along this conveyor in the reclamation shop are Magnaglo and Zyglo machines and work stations for checking and rebuilding such engine components as cylinder heads. The electrical shop has equipment for checking and rebuilding both locomotive and passenger car equipment.

Tracks 5 and 4, designated for light and heavy passenger car repairs respectively, have between-the-rails pits in the main shop bay. Jacking pads extend the full 240 ft lengths of these tracks through the main and south bays. Jacks are used for raising carbodies for truck work. Classified repairs are given to two to four passenger cars monthly. Light repairs to RF&P and foreign passenger cars average four daily. Throughout the passenger car repair area, also through the adjacent freight-car repair area, are hose reels for delivering steam, compressed air and water.

In the locomotive shop area, as well as in this car-shop area, electrical and welding receptacles are located at convenient intervals. Capacity of the shop electrical system is 2,000 Kva, with the primary feeding two substations within the shop building. Distribution is at various voltages ranging from 480 to 120 volts.

While the heavy freight-car repair track does not have pits, the concrete floor between and at both sides of the rails has a depressed area flush with the rail base. An average heavy repair load is 15 cars per month.

The light freight-car repair track at the east end of the shop has been equipped with a Whiting spot-type repair system. All equipment is controlled from an operator's console with jacks, rabbits, derail and shop doors being electrically interlocked for safe operation. Separate intercom and warning systems have been installed for this car-repair operation. Cars are moved to the jacking spot by the rabbit from distances as great as 550 ft from the south door of the building. A second rabbit system moves repaired cars out of the shop after work has been completed.

Jacking is done with 80-ton traversing jacks. Jib cranes at both ends of the jacking spot are equipped with power hoists for truck disassembly. Hose reels at four locations around the repair spot supply compressed air, oil, grease, oxygen and acetylene. Tools are mounted on boards at the spot. Repair materials are stored on shelves, racks, revolving bins and stack-type skid boxes in the repair area. This light car-repair facility has a capacity of 33 cars per day with the present work load being approximately 25.

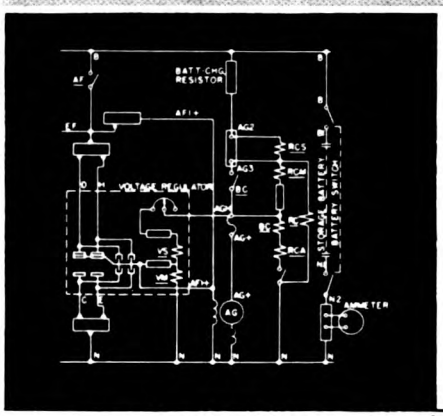
Force at Bryan Park shop totals over 260, with approximately 160 in the locomotive department, 90 in the car department, and the remainder stores and shop maintenance employees.

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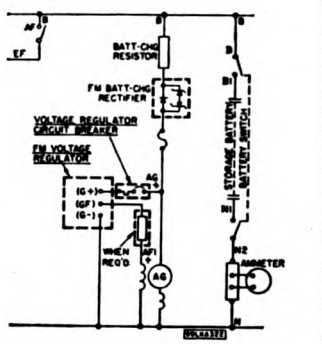
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Report

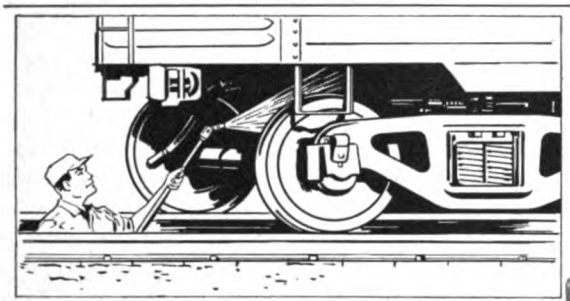
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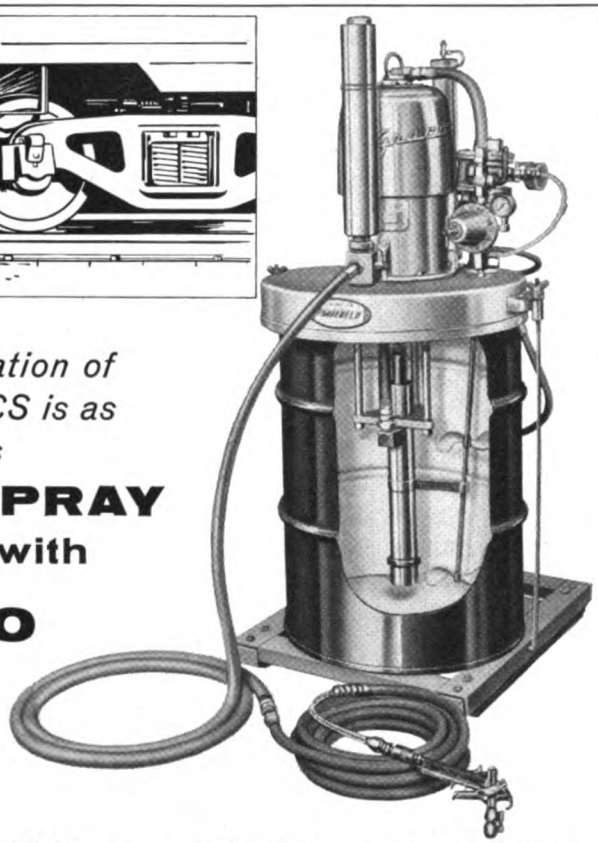
instance between the representative of the carrier and the general chairman of the craft involved), all work, which if performed by the carrier with its own employees would be covered by such agreements, shall be performed by employees covered by such agreements. The carrier shall not (1) contract with others for the performance of any such work; (2) contract with others for the trade-in or repurchase of equipment, unit exchange, the installation, repair, rebuilding or replacement of equipment or the component parts thereof; (3) lease or purchase equipment or component parts thereof, the installation, operation, servicing or repairing of which is to be performed by the lessor or seller. In case of any violation of this rule, the employee or employees who would have performed such work, if it had been performed without violation of this rule, shall be compensated on the same basis as if they or he had performed the work.

● The same protective benefits as those afforded by Sections 4, 6, 7, 8, 9, 10 and 11 of the Agreement of May 1936, Washington, D. C., shall be applicable to employees who are displaced or deprived of employment as a result of changes in the operations of this individual carrier such as:

Transfer of work; abandonment, discontinuance or consolidation of facilities or services, or portions thereof; contracting o of work; lease or purchase of equipment component parts thereof, the installatio operation, servicing or repairing of whic is to be performed by the lessor or selle voluntary or involuntary discontinuance contracts; technological changes; install tion of labor saving equipment and m chinery; trade-in and repurchase of equi ment or unit exchange; and any changes work assignments or operations other tha those resulting solely from decline in vo ume of traffic.

● The coupling and uncoupling of ai steam and signal hose, testing air brakes an appurtenances on trains or cuts of cars yards and terminals, shall be Carmen work.





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T. F. & H. H. Going
6308 Limewood Circle

SAN FRANCISCO
The Barnes Supply Company
141 Eleventh Street

HOUSTON
Houston Railroad Supply Co.
1610 Dumble Street

ST. LOUIS
The Carriers Supply Company
2816 S. Brentwood Blvd.

TWIN CITIES—St. Paul, Minn.
The Daniel L. O'Brien Supply Company
Endicott-On-Fourth Bldg.

WASHINGTON—Arlington, Va.
Southeastern Railway Supply, Inc.
2304 Wilson Blvd.

MONTREAL—Ontario, Canada
International Equipment Co., Ltd.
360 St. James Street West

Brake Data Required by AAR Group

A basic list of brake information whic must be furnished when submitting brak arrangements for new designs of freigh cars for AAR approval has been prepare by the Mechanical Division. Both railroad and private car owners will be required t report the following: Lightweight, nomina capacity, rail-load limit, lever ratio, brakin ratio, total braking force with the air brak and with the hand brake. Drawings mus show location of all parts of the system in cluding brake valve, reservoir, cylinde cut-out cock, brake cylinder release valve retaining valve, slack adjuster hand brake and angle cocks.

In another action, the AAR Lubricatio Committee gave conditional approval, a of November 15, to Oilrite, Centra-Feed and Karpak journal lubricating devices Thirteen lubricators had already receive conditional approval. None has bee granted full approval.

Burlington Building New Diesel Shop

The Burlington will construct a 150-f x 431-ft diesel repair shop at Lincoln, Neb The steel frame and metal siding structure costing approximately $780,000, is expecte to be completed in two years as part of th road's modernization program at Lincoln Havelock, the Burlington's freight-car build ing and repair facility, is located near Lin coln.

Personal Mention

Chesapeake & Ohio.—Former lubrication in spectors now assistant general car inspector at *Richmond, Va.:* AUBREY G. HALL. *Cli ton Forge, Va.:* JAMES N. ANDERSON. *Hun ington, W.Va.:* ROBERT L. ERWIN. *Ashland Ky.:* WILLIAM S. HAMLIN. *Peru, Ind* CHARLES C. LANE. *Columbus, Ohio:* DEL MER T. WILSON. *Grand Rapids, Mich* CLAYTON DOANE.

Erie-Lackawanna.—*Cleveland, Ohio:* WILLIA G. CARLSON, assistant superintendent of mo tive power, appointed chief mechanical of ficer, succeeding CHESTER K. JAMES, retired

Mr. Carlson entered the employ of th

ie as a carpenter helper in 1938. In 1939 became a special apprentice and, later, nachinist. Following service in the U.S. my, he returned to the Erie, becoming, asecutively, general foreman at Dayton, io; Buffalo, N.Y., and Hornell, N.Y.; ister mechanic at Hornell; district master chanic at Jersey City; and assistant su- intendent motive power at Cleveland. continued in the latter position upon rger of the Erie and the Delaware, Lack- anna & Western. (Photo page 50.)

sey Central Lines.—*Elizabeth, N.J.:* F. P. ESLEY, appointed superintendent locomo- e shop.

iisville & Nashville. — *South Louisville, .:* Organizational set-up revised as fol- vs: R. J. MAY, formerly shop superin- dent, now works manager; R. L. AGEE, ff assistant electrical; R. L. ASHLEY, ff assistant, pipe and sheet metal; E. F. HULZ, staff assistant, welding; J. A. MON- AN, staff assistant, accident and fire pre- ition; W. H. MITCHELL, division manager, tive power; M. F. HORN, department nager, methods and procedures; HOWARD INTYRE, division manager, equipment.

waukee.—*Milwaukee, Wis.:* J. J. DRINKA, istant to car department superintendent, ointed assistant to chief mechanical offi- , Milwaukee shops.

folk Southern. — *Raleigh, N. C.:* J. W. TON appointed master mechanic.

Pennsylvania. — *Philadelphia, Pa.:* W. H. MILLER, superintendent locomotive equipment, appointed master mechanic.

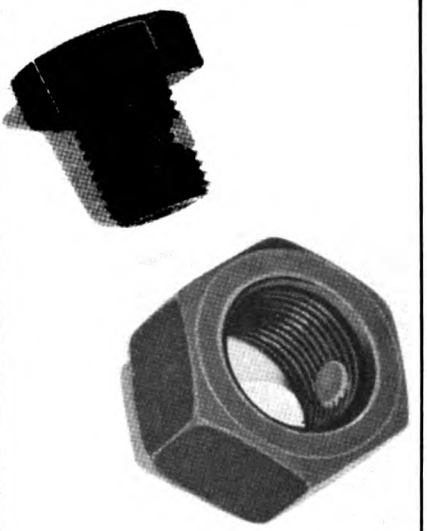
Santa Fe.—*Los Angeles, Calif.:* L. L. LUTHEY appointed to newly created position of general master mechanic, with jurisdiction over mechanical department matters on San Francisco Terminal, Valley, Albuquerque and Los Angeles divisions. *San Bernardino, Calif.:* L. B. ENGLISH appointed superintendent of shops, succeeding Mr. Luthey. *Barstow, Calif.:* E. M. HIATT appointed superintendent of shops, succeeding Mr. English. *Chicago:* D. M. MILLER appointed master mechanic, succeeding Mr. Hiatt. Mr. Miller formerly master mechanic at Arkansas City, Ark. *Newton, Kan.:* W. R. COWDREY, master mechanic, promoted to new position of general master mechanic, with jurisdiction over Arkansas City and Newton. *Richmond, Calif.:* W. W. LYONS, master mechanic, retired.

Southern.—*Alexandria, Va.:* J. B. WADDLE appointed general diesel supervisor. Formerly process engineer at Washington. *Birmingham, Ala.:* H. E. EDWARDS appointed road foreman of engines.

OBITUARY

Frederick A. Beischer, 73, retired electrical supervisor of the Lackawanna (now Erie-Lackawanna) died October 25 in Passaic, N.J., after a brief illness.

Product Reference 49A



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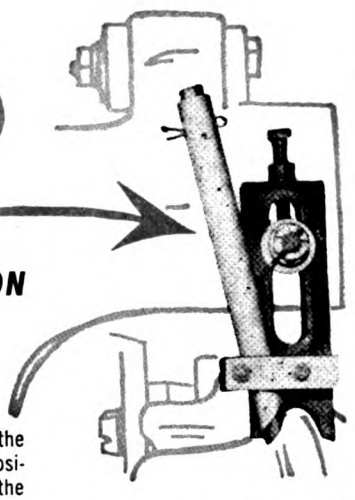
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Supply Trade

WINE RAILWAY APPLIANCE CO.—*Orville Ingram*, district sales manager, eastern territory, appointed sales manager of Wine, a division of Unitcast Corp., with headquarters at Toledo, Ohio. Mr. Ingram will be responsible for national sales and marketing of specialized railway appliances.

CARDWELL WESTINGHOUSE CO.—*Arthur D. Huff, Jr.*, Inc., New York, appointed New England representative.

AJAX CONSOLIDATED CO.—*A. R. Kidd Co.*, 1036 Suburban Station Bldg., Philadelphia 3, Pa., appointed sales agent, eastern United States. *R. W. Kelly*, also in Philadelphia, will continue as district sales manager of Ajax, a division of Pentron Electronics Corp.

CHICAGO RAILWAY EQUIPMENT CO.—*J. A. Liddell* vice president, sales and market research, National Lock Washer Co., Newark, N.J., appointed vice president-sales, Chicago Railway Equipment Co., with headquarters at Chicago. Mr. Liddell will be responsible for railroad sales of both companies.

MAGNUS CHEMICAL CO.—*A. W. Bowling, Jr.*, elected president, and *B. H. Bailey, Jr.*, executive vice president and general sales manager. *R. D. King* named vice president in charge of National Sales, and *R. P. Edmonds*, vice president in charge of Finishes and Coatings Sales.



J. C. MacInnes
B-L-H



F. R. Brown
Unicast



Orville Ingram
Wine



W. G. Carlson
E-L

UNITCAST CORP.—*Floyd R. Brown*, vice president-marketing, elected executive vice president. Mr. Brown will be responsible for over-all sales, marketing and general operation of the corporation in addition to the Wine Railway Division.

AMERICAN SAB CO.—*Uri B. Grannis, Jr.*, appointed sales manager, with headquarters in Chicago.

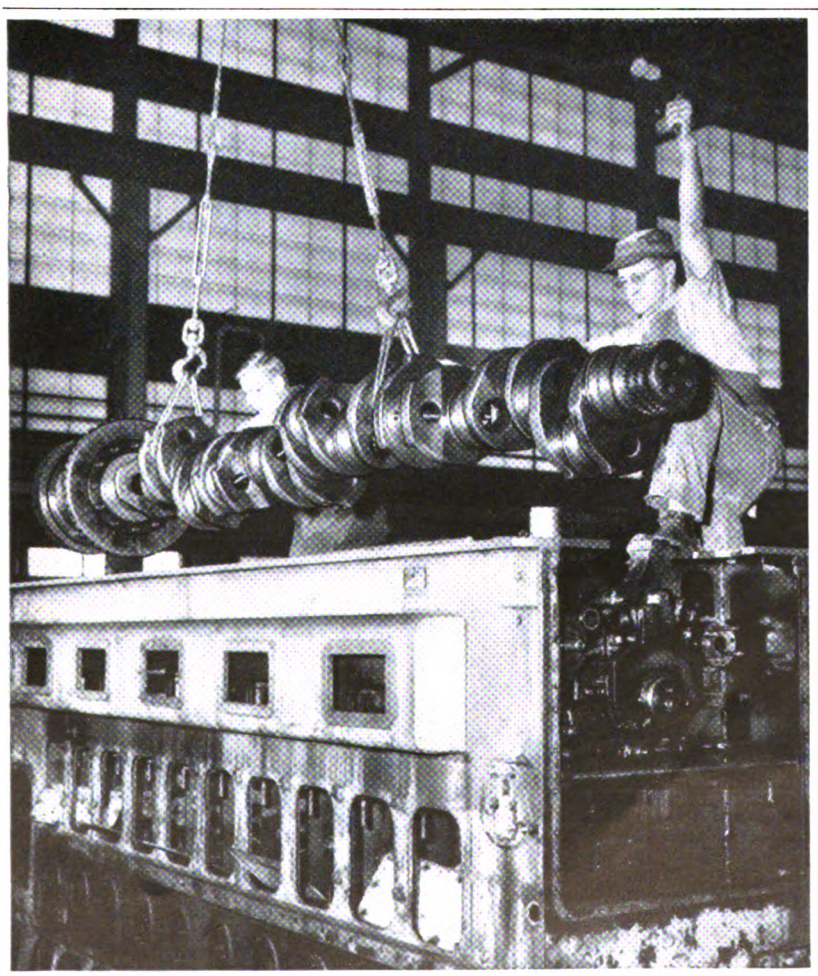
ELLCON-NATIONAL.—New York office moved from 30 Church Street to 74 Trinity Place.

NATIONAL CASTINGS CO., TRANSPORTATION PRODUCTS DIV.—*Glenn G. Tenney* appointed manager; *Robert W. Grandy*, assistant manager, Chicago sales office, with *John F. Hutson* remaining as assistant vice president; *James J. Schustrich*, manager, Philadelphia sales office; *Swen W. Neilson*, assistant manager, San Francisco sales office; *Robert F. Norton*, assistant manager of mill sales, Cleveland.

BALDWIN-LIMA-HAMILTON CORP.—*James C. MacInnes* appointed manage Transportation and Renewal Parts Sal Dept., Industrial Equipment Div., succee ing *E. F. Sheehan*, retired.

STANRAY CORP., STANDARD RAILW EQUIPMENT DIV.—*Daniel M. Lyons*, ge eral manager, Hammond (Ind.) operatio appointed president and general manage Stanray Products Div., Hammond. *Luci C. Williams* appointed eastern district sal manager at New York. *John E. Earp* nam western district sales manager. Mr. Wi liams formerly sales representative, Natio al Castings Corp.; Mr. Earp, assistant director of marketing, Stanray.

GENERAL ELECTRIC CO.—*John Dwyer* named manager of transportation i dustry sales, Eastern and Northeastern r gions, Industrial Sales Operations, at Ne York. Mr. Dwyer responsible for sales railroads and rail transit systems.



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CF INDUSTRIES, INC.—Production of CF Center Flow cars transferred from rwick, Pa., to Huntington, W. Va., plant, d production of piggyback cars, trailer ches, cushioned container cradles, and intenance-of-way equipment transferred m Berwick to expanded facilities at St. uis. The Berwick plant, the planned clos- of which was announced in November 61 (RL&C, Dec. 1961, p 6), has now been d. *Donald E. Marteeny* appointed as- tant plant manager for Huntington local lroad car building facilities. Mr. Mar- ny formerly assistant plant manager at rwick.

YSTONE RAILWAY EQUIPMENT .—*Robert H. Gurley*, president, Trans- p Corp., Chicago, appointed Keystone es agent to handle certain railroads in icago area.

IVERSAL RAILWAY DEVICES CO. *rthur D. Huff, Jr., Inc.*, New York, ointed New England representative.

CK MANUFACTURING CO.—*Wil- n M. Freeburg* named western regional s manager.

OBITUARY

DAN F. HALL, 65, vice president and stern sales manager, Hunt-Spiller Manu- turing Corp., died October 6 at his home Dubuque, Iowa.

Trade Publications

obtain copies of publications, circle responding numbers on card following e 52.)

TOOL GRINDERS. Bulletin K2B de- ibes Contelyt contact wheel electrolytic l grinders—the Cadet for toolroom work the PH-175-200 for larger work. Ex- l-O Corp.

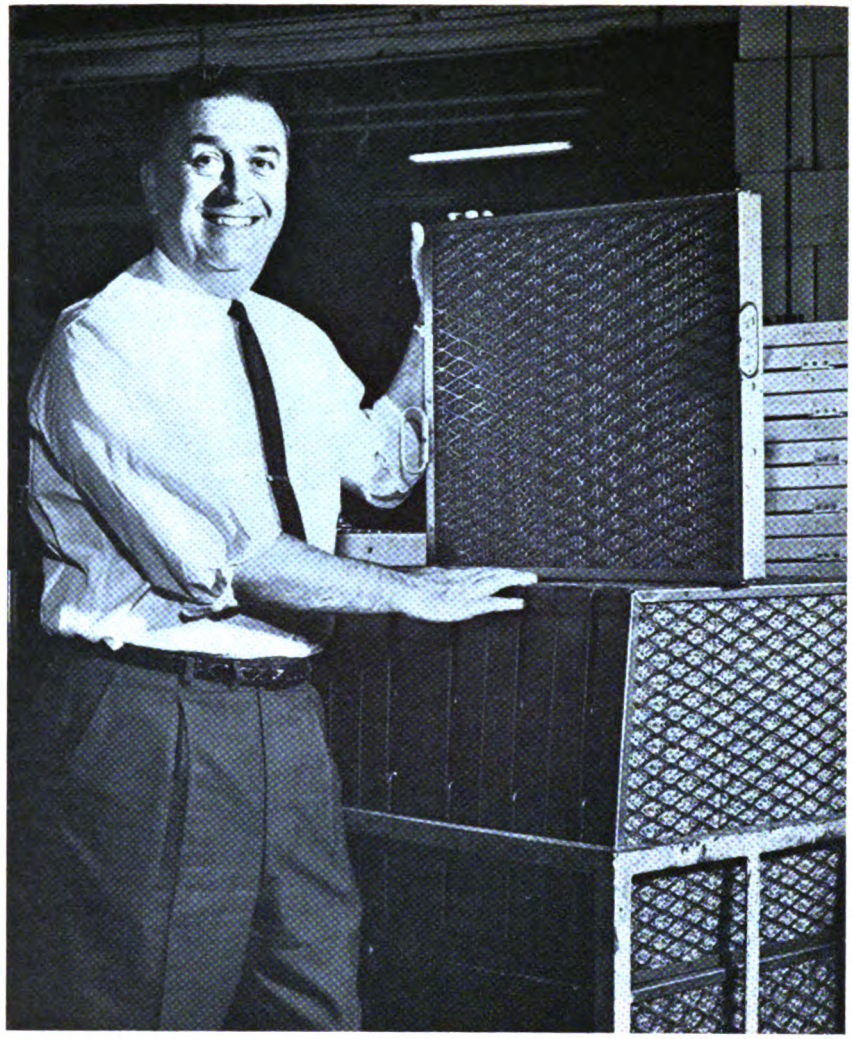
COMMUTATORS. Catalog No. 67 in- les specifications and prices on over 500 k replacement commutators. Toledo nmutator Co.

INDUCTION HEATING GENER- ORS. Catalog on Megacycle Frequency uction Heating Generators from 2½ to kw contains general features, dimensions, operating specifications. High Frequen- Laboratories, Inc.

MARAGING NICKEL STEELS. klet contains tables and graphs describ- compositions, physical and mechanical perties, welding and heat treatment of h-strength maraging nickel steels. Inter- ional Nickel Co.

TANK CLEANING UNIT. Bulletin describes Model "C" Jumbo Tank ning units. Capacities at 10 different er pressures tabulated. Sellers Injector p.

"HOW TO SELECT ABRASIVES". klet covers basic principles of blast ning—reduction of cleaning, finishing descaling costs through proper abrasive ction. Pangborn Corp.



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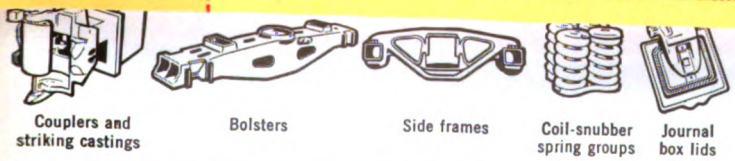
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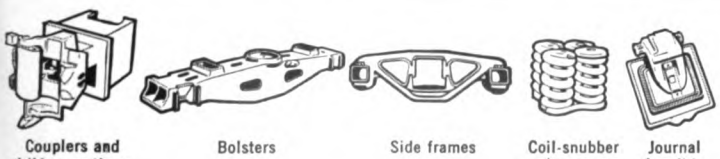


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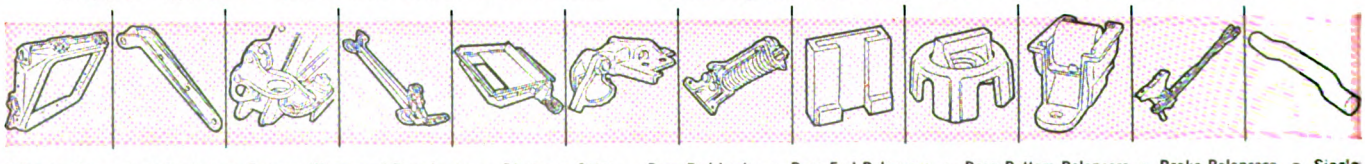
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